# Industrial Arts and Vocational Education

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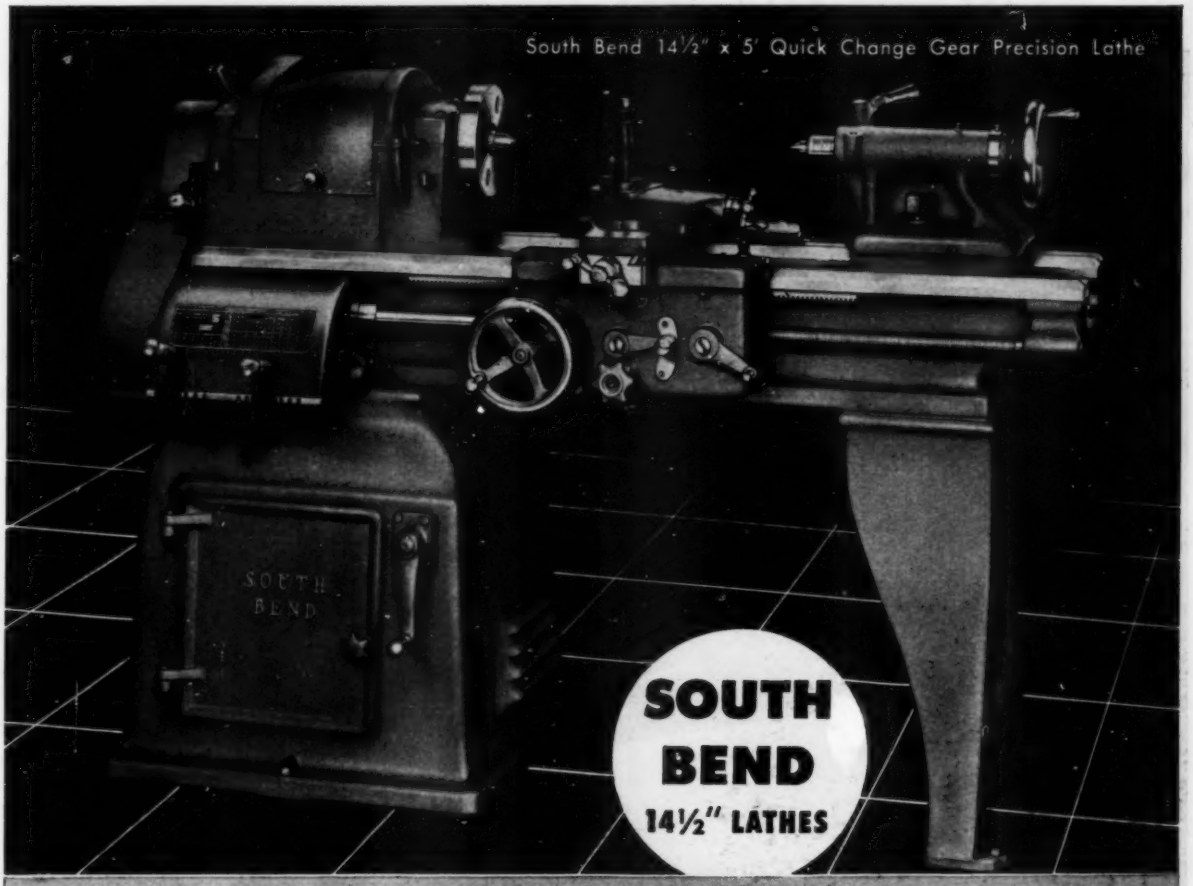


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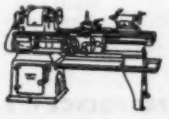
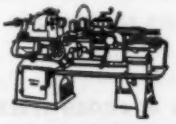
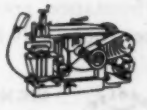

☐ 10" to 16-24" FLOOR LATHES


☐ ½" and 1" Collet TURRET LATHES

☐ 14" DRILL PRESSES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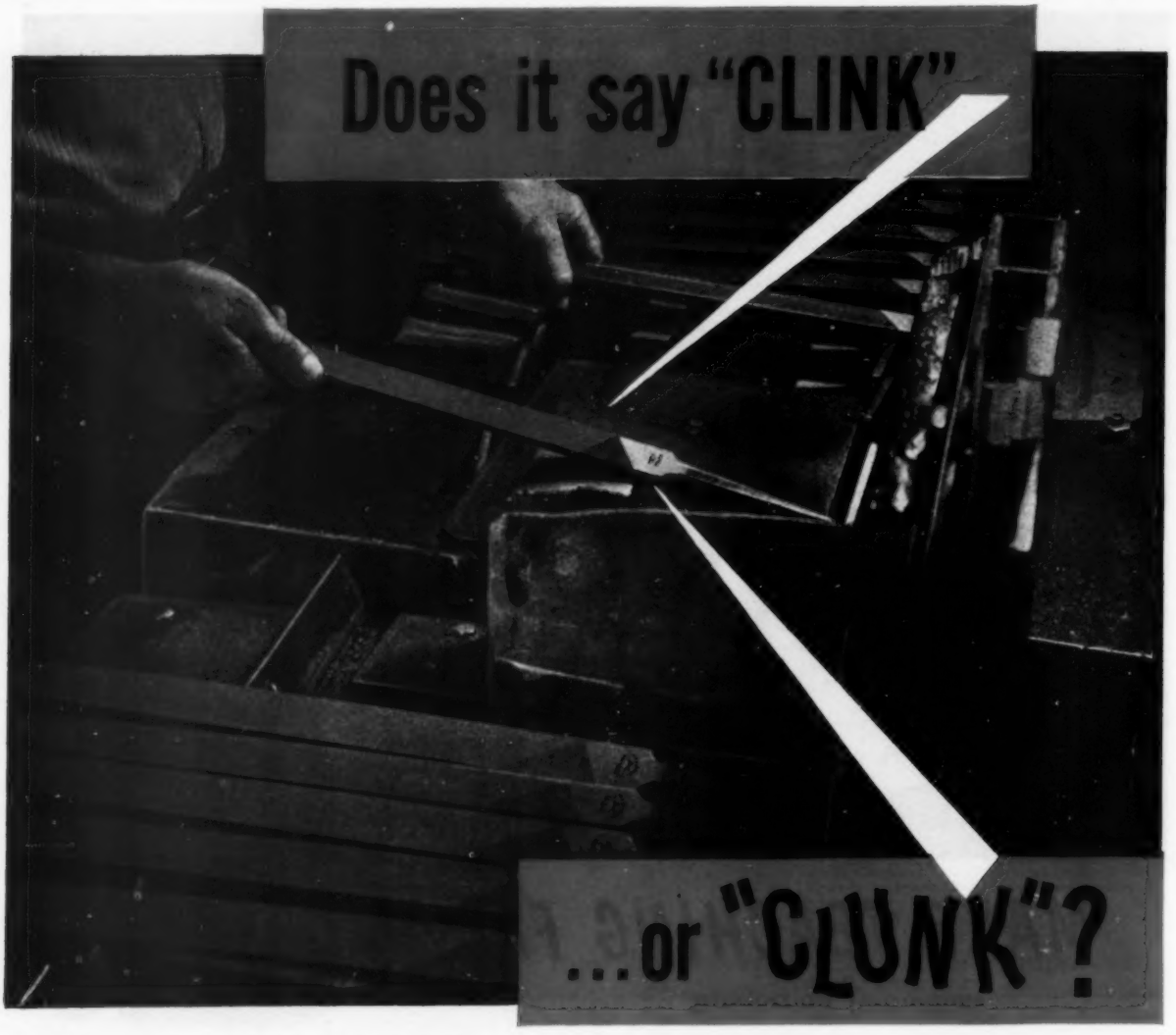


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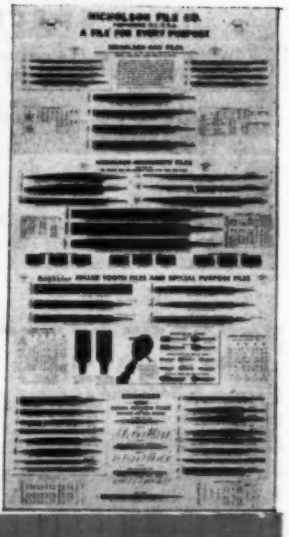

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Vol. 41 No. 8

OCTOBER, 1952

# INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

***THE SHOP TEACHERS' PROFESSIONAL MAGAZINE***

Published on the 15th of month preceding date of issue

**THE BRUCE PUBLISHING COMPANY,** 400 North Broadway, Milwaukee 1, Wis. • CENTRAL OFFICE: 20 North Wacker Drive, Chicago 6, Ill. • EASTERN OFFICE: 225 Broadway, New York 7, N. Y.

★ ★ ★ ★

### This Month's Cover

The October cover of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION shows some members of a graphic-arts class as they receive their first introduction to Linotype operation.

This picture is another indication that the fair sex has the ambition to tackle jobs at one time held only by men.

Some of the women Linotype operators who are already serving in industry have shown that the work is not too difficult for them, and some of them have become just as skillful as their male co-workers.

The photograph was submitted by H. C. Taylor, assistant professor of graphic arts and head of the department, Arkansas State College, State College, Ark.

★ ★ ★ ★

Entered January 2, 1914, as Second-Class Mail Matter at Milwaukee, Wis., under Act of March 3, 1879. Copyright, 1952, by the Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office, November 25, 1930. Published monthly except during July and August.

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***Discontinuance.*** — Notice of discontinuance of subscription must reach the Publication Office in Milwaukee, at least fifteen days before date of expiration. Notices of changes of address should invariably include the old as well as the new address. Complaints of nonreceipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

***Editorial Contributions.*** — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for upon publication. In all cases manuscripts should be accompanied by full return postage.

***Articles Indexed.*** — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

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# ASSOCIATION NEWS

## COMING CONVENTIONS

*Oct. 3–4.* Ohio Vocational Association, at Southern Hotel, Columbus, Ohio. Secretary: Ralph Woodin, Ohio State University, Columbus, Ohio.

*Oct. 16–18.* Maryland Industrial Education Division of MSTA, at Lord Baltimore Hotel, Baltimore, Md. Secretary: Milton C. Raver, 1101 N. Calvert St., Baltimore, Md.

*Oct. 16–19.* Maryland Vocational Association, at Lord Baltimore Hotel, Baltimore, Md. Secretary: Anna R. Macks, Baltimore County Department of Education, Towson, Md.

*Oct. 20–24.* Fortieth National Safety Congress and Exhibition, at Chicago, Ill. Sessions to be held at Conrad Hilton, Congress, Morrison, Sheraton and La Salle Hotels. General secretary: R. L. Forney, National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

*Oct. 23–24.* Minnesota Industrial Arts Association, at Municipal Auditorium, St. Paul, Minn.

*October 24.* Virginia Vocational Association, at John Marshall Hotel, Richmond, Va.

*October 30.* Rhode Island Vocational and Industrial Arts Association, at 205 Beriefel St., Providence, R. I. Secretary: Richard Durham, 393 Power Rd., Pawtucket, R. I.

*Oct. 30–31.* Oklahoma Industrial Arts Association, at Oklahoma City Capitol Hill Senior High School. Secretary: Cary L. Hill, A. & M. College, Stillwater, Okla.

*Nov. 6–7.* Kansas Industrial Education Association, at Topeka, Kans. Secretary: Donald W. Lake, Jr. High School, Coffeyville, Kans.

*Nov. 6–7.* Kansas Vocational Association, at Topeka, Kans. Secretary: F. E. Carpenter, Highland Park Rural High School, Topeka, Kans.

*Nov. 6–7.* Missouri Vocational Association, at Kansas City, Mo. Secretary: H. H. London, University of Missouri, Columbia, Mo.

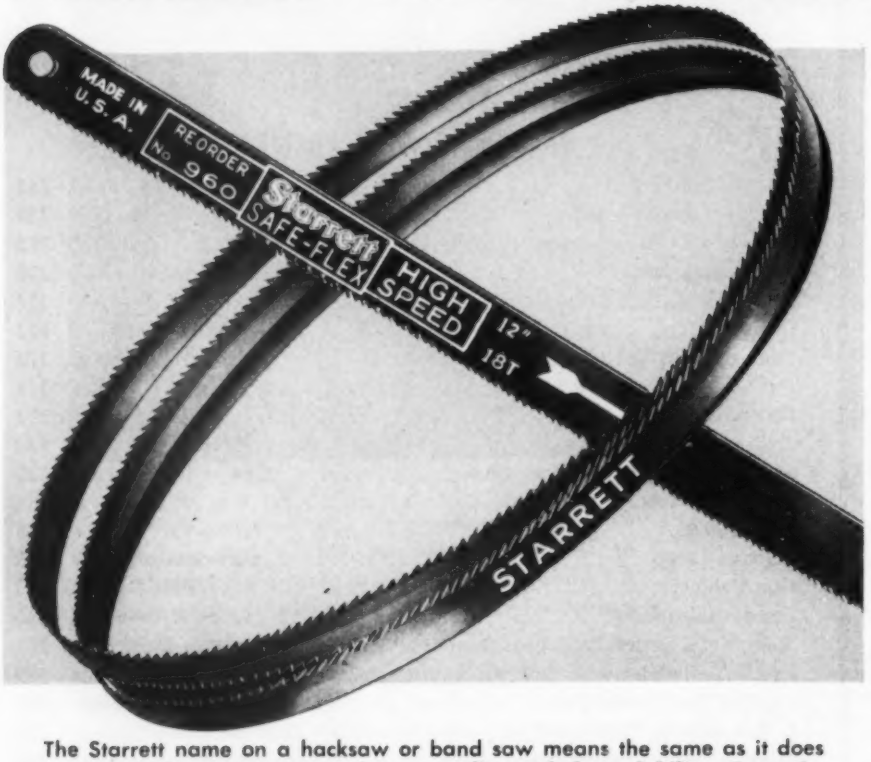
*Nov. 6–8.* Iowa Industrial Education Association, at Des Moines, Iowa. Secretary: Richard Allen, Woodside School, Des Moines, Iowa.

*Nov. 6–8.* Iowa Vocational Association, at Des Moines, Iowa. Secretary: Eleanore L. Kahlmann, State House, Des Moines, Iowa.

*Nov. 7–8.* New England Industrial Arts Teachers Association, at Eastland Hotel, Portland, Me.


Starrett

HACKSAWS and BAND SAWS




The Starrett name on a hacksaw or band saw means the same as it does on a precision measuring tool . . . **quality and dependability.** From the complete Starrett line you can choose with confidence the right hacksaw for cutting metal by hand or machine or the right band saw for cutting metals, wood, plastics, etc. Make it a habit to specify **STARRETT.**

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## EPSILON PI TAU HOLDS INITIATION AND LUNCHEON — ALPHA OMICRON CHAPTER

Alpha Omicron Chapter of Epsilon Pi Tau held their initiation and luncheon on Saturday, July 26, 1952, at the Belcrest Hotel, Detroit, Mich. The topic for discussion was "Preparation for Leadership in Industrial Arts." Paul E. Powell acted as chairman.

Twelve new initiates were taken into the fraternity. They are: Stanley E. Black, Midland, Mich.; Stanley J. Carter, Hampton, Va.; David H. Galarneau, Detroit, Mich.; Harry L. Johnson, Norfolk, Va.; Robert N. Lippert, Pigeon, Mich.; Donald B. Meier, Ferndale, Mich.; Carl A. Moeller, College Station, Tex.; Leo C. Parent, Windsor, Ont., Can.; Paul F. Payne, Detroit, Mich.; Francis W. Richardson, New Orleans, La.; Paul R. Savageau, Willow Run, Mich.; and Stephen M. Wichar, Detroit, Mich. — *Paul E. Powell.*

## THE MADISON CONFERENCE ON PRINTING EDUCATION

The 28th Annual Conference on Printing Education sponsored by the International Graphic Arts Education Association, was held June 29 through July 2, in Madison, Wis. Over two hundred teachers and persons interested in the graphic arts field attended the various sessions.

Prominent among the program speakers were: Clarence Greiber, state director, Wisconsin Vocational and Adult schools; Dr. Edward C. Estabrooke, secretary and educational director, American School, Chicago; Pearl E. Oldt, executive secretary, International Ass'n of Printing House Craftsman, Cincinnati; Wayne V. Harsh, editor, The Inland Printer, Chicago; Arthur A. Wetzel, president, Printing Industry of America; and Fred J. Hartman, educational director, International Graphic Arts and Educational Association, Washington, D. C.

The following were elected officers of the association for the ensuing year: Patrick F. Bouglad, The New York School of Printing, New York, N. Y., president; Edward Parker, Ryerson Institute of Technology, Toronto, Canada, vice-presi-

(Continued on page 6A)

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Ideal size for school shops. 14" x 14" precision-ground table tilts 45°. Cuts stock to 6¼" thick. Ball bearing wheels and blade supports.

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DEPENDABLE QUALITY TOOLS SINCE 1911

## ASSOCIATION NEWS

(Continued from page 4A)

dent; Otis H. Chidester, Senior High School, Tucson, Ariz., secretary; and Vincent C. Coyne, Middlesex County Vocational School, New Brunswick, N. J.

### STUDENTS ORGANIZE A STATE VOCATIONAL CLUB

The Vocational Industrial Club of Ohio held its organizational and first annual state convention at Ohio State University, Friday, February 22, 1952. More than 250 students from 30 cities throughout Ohio registered for the convention which was held in the new Ohio Union.

Interest and enthusiasm was displayed as the students adopted the constitution, a statement of purposes, club pin, symbolism of club pin, pledge, creed, and the election of officers. Since there were no officers prior to the constitutional convention, John Foltz, state president of the Future Farmers of America; Lois Wilson, state project chairman for the Future Homemakers of America; and Richard Young, representing the Distributive Education Club of America, and president of the Zanesville Chapter, presided during the opening business session. They were introduced by Ralph A. Howard, director of vocational education for the state of Ohio. Mr. Howard outlined the advantages of a state organization and encouraged the students to work co-operatively with the other state vocational clubs.

Dr. Ralph Bender, chairman, Agriculture Education Department at Ohio State University, was the keynote speaker and enumerated the values which the student members of the Future Farmers of America received from their organization.

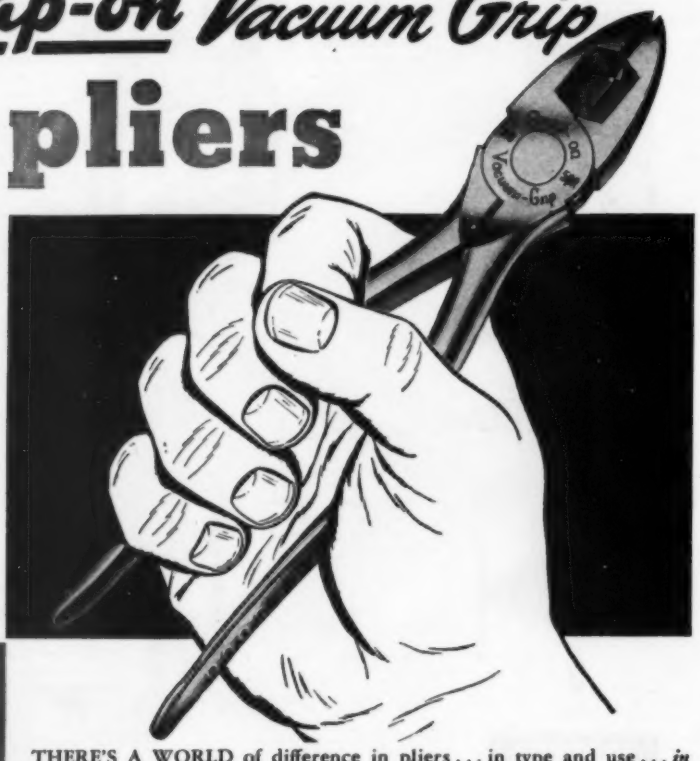
Delegates chose the name VIC for the new Vocational Industrial Club.

The first elected officers for the state club were: John E. Ricksecker of Findlay, Ohio, president; Jake Bell, Portsmouth, Keith Brown, Troy, and Jane Hockstetler, Ashland, vice-presidents; and Catherine Pastors, secretary-treasurer. Byrl R. Shoemaker, assistant supervisor, trade and industrial education was appointed to serve as club sponsor.

The students then attended a luncheon served in the ballroom of the Ohio Union. Robert M. Reese, state supervisor of trade and industrial education gave the invocation and welcomed the members and guests. He complimented the co-operative action displayed by the local clubs in thirty different high schools in forming a state organization to provide additional leadership and citizenship activities for the members of the club. Elmer C. Baden, co-ordinator, Diversified Co-operative Training at Troy, served as toastmaster. He introduced the guests and guest speakers. Luncheon talks were given by Orville Jones, representative, Ohio Council C.I.O.; Henry Freeman, representative, Ohio State Federation of Labor; and Robert R. Bangham, representative, Ohio Manufacturers Association. Mr. Jones stressed the importance of developing leadership capabilities, Mr. Freeman emphasized the need for developing skill, and Mr. Bangham discussed the importance of developing good citizenship.

The members of the Vocational Industrial Club planning committee are: K. J. Herbert, supervisor, trade and industrial education, Barberton, Ohio, chairman; E. C. Baden, co-ordinator, diversified co-operative training, Troy, Ohio; W. C. Kelley, co-ordinator, trade and industrial education, Lancaster, Ohio; D. A. Morris, supervisor, trade and industrial education, Elyria, Ohio; and C. P. Shorck, co-ordinator, diversified co-operative training, Ashland, Ohio.


Snap-on* Vacuum Grip pliers



THERE'S A WORLD of difference in pliers . . . in type and use . . . *in quality* and *durability*. It's important that, in everyday training, students *learn* the difference! Snap-on Vacuum Grip Pliers are made in a complete range of 31 types and sizes . . . only *one* quality . . . the finest the toolmaker's craft can produce! Hammer forged from special alloys . . . specially heat treated and hardened clear through . . . they are built to outlast several pairs of ordinary pliers. Joints are precision machined, perfectly matched, locally tempered, easy riding. Sharp, deeply milled teeth give intense gripping power with minimum pressure. The vacuum grip handles provide non-slip security. Snap-on Vacuum Grip Pliers are described in the complete 104-page Snap-on catalog—sent free to school officials and shop instructors.

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## *Personal News*

### LAURENS L. SIMPSON DIES

♦ LAURENS L. SIMPSON, president and chairman of the board, Chas. A. Bennett Co., Inc. (formerly The Manual Arts Press), died after recurrent illness, at the age of 72, in Peoria, Ill., August 4, 1952. His death marks the passing of one of the few remaining pioneers in industrial education, art, and home-economics book publishing.

For more than fifty years he was closely associated with education and educational works. After attending college at Bradley Polytechnic Institute and the University of Chicago, where he taught in the secondary school from 1900 to 1903, he became a mechanical drawing instructor at Central High School, Minneapolis, Minn. Here he remained until 1910. Students of his, to this day, recall the special emphasis on accuracy which marked his teaching methods.

In 1910, he came to The Manual Arts Press as sales manager, and was in charge of both the book list and advertising and promotion for *Manual Training Magazine*, later *Industrial Education Magazine* — which was discontinued in 1939.

In 1912 he was elected treasurer, and also business manager of the magazine and the book de-

(Continued on page 8A)

**B&D DRILLS** give students practical experience in all kinds of drilling: in metal, wood, plastics, masonry. Drive Hole Saws, double as sturdy drill presses in B&D Bench Stands.

**B&D SCREW DRIVERS** will speed up training projects involving driving all types of fasteners in assembling wood, metal, plastic parts. Accurate, compact, easy to handle.

**B&D SANDERS** help you teach many finishing jobs—sanding, grinding, burnishing, cleaning. Drive abrasive discs, saucer grinding wheels, "Whirlwind" wire cup brushes.

**B&D BENCH GRINDERS** are quality-built for long service in your shop. Train students in tool sharpening, grinding, buffing, burnishing, cleaning operations.

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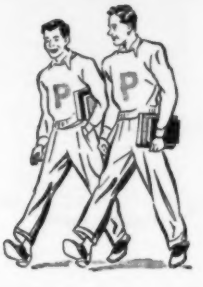

USING Black & Decker Tools to train your students gives them a head start toward doing better jobs in industry! That's because they'll find B&D Tools wherever they go . . . in factories, small shops and garages alike. And working with the same tools they learned to use in school gives them added confidence when they make the switch from school to shop.

What's more, you'll find it *easier to teach* with B&D Tools. They're husky, dependable, easy to handle, safe to use—all qualities that are hard to beat when you're working with green hands. And B&D Tools *cost you less in the long run*, because they outlast cheaper types! See your nearby Black & Decker Distributor for complete information on over 100 Tools and hundreds of accessories. Write for free catalog to: THE BLACK & DECKER MFG. CO., 616 Pennsylvania Ave., Towson 4, Md.

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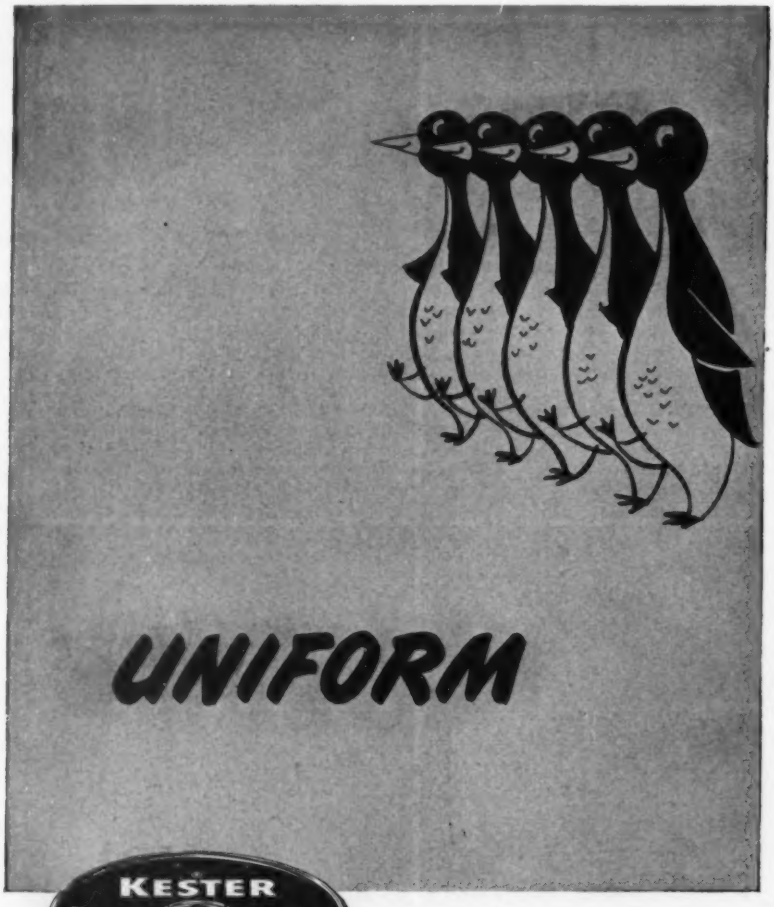

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***UNIFORM*** **Results for You**
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You should use Kester Acid-Core and Rosin-Core Solders in your classroom instruction because these are the Solders the Student will be using when he graduates into commercial fields.

It will be to your credit to make sure he is familiar with the well known and widely used Kester Flux-Core Solders.

*Two Free Manuals: One for the instructor and a modified version for the student.*

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KESTER SOLDER

## PERSONAL NEWS

(Continued from page 6A)

partment. In December, 1929, he was asked to launch a new magazine, *The Home Economics News*, at a time when the market was small and the depression was beginning to set in. The substantial subscription list of this magazine later was sold to *Practical Home Economics* magazine, which is still in operation.

He became president of the company in 1940, and, after the death of Charles A. Bennett in 1942, president and chairman of the board of directors.

**Laurens L. Simpson**

Laurens L. Simpson was a charter member of The Ship, a strong organization of commercial exhibitors in the educational field, and served a term as council member in the Western Arts Association, representing The Ship. He was a charter member of the University of Chicago chapter of Sigma Alpha Epsilon, and a member of Rotary Club (Peoria) and the National Education Association. He was the author of *Mechanical Drawing Conventions*, 1908.

As president of Chas. A. Bennett Co., he was notably successful in securing the works of authors here and abroad which enjoyed a demand both from the schools and the bookstores. In addition, one of his most active interests was in the production of professional books, for their educational value to teachers rather than for commercial returns. His encouragement of such works has resulted in the publication of several well-known teacher-training textbooks in the fields of industrial education.

The many who have known him through business or personal acquaintance will remember him most of all for his vigor, honesty, courage, and kindness of spirit. The quality of youthfulness never left him. He derived tremendous joy and pride from his work.

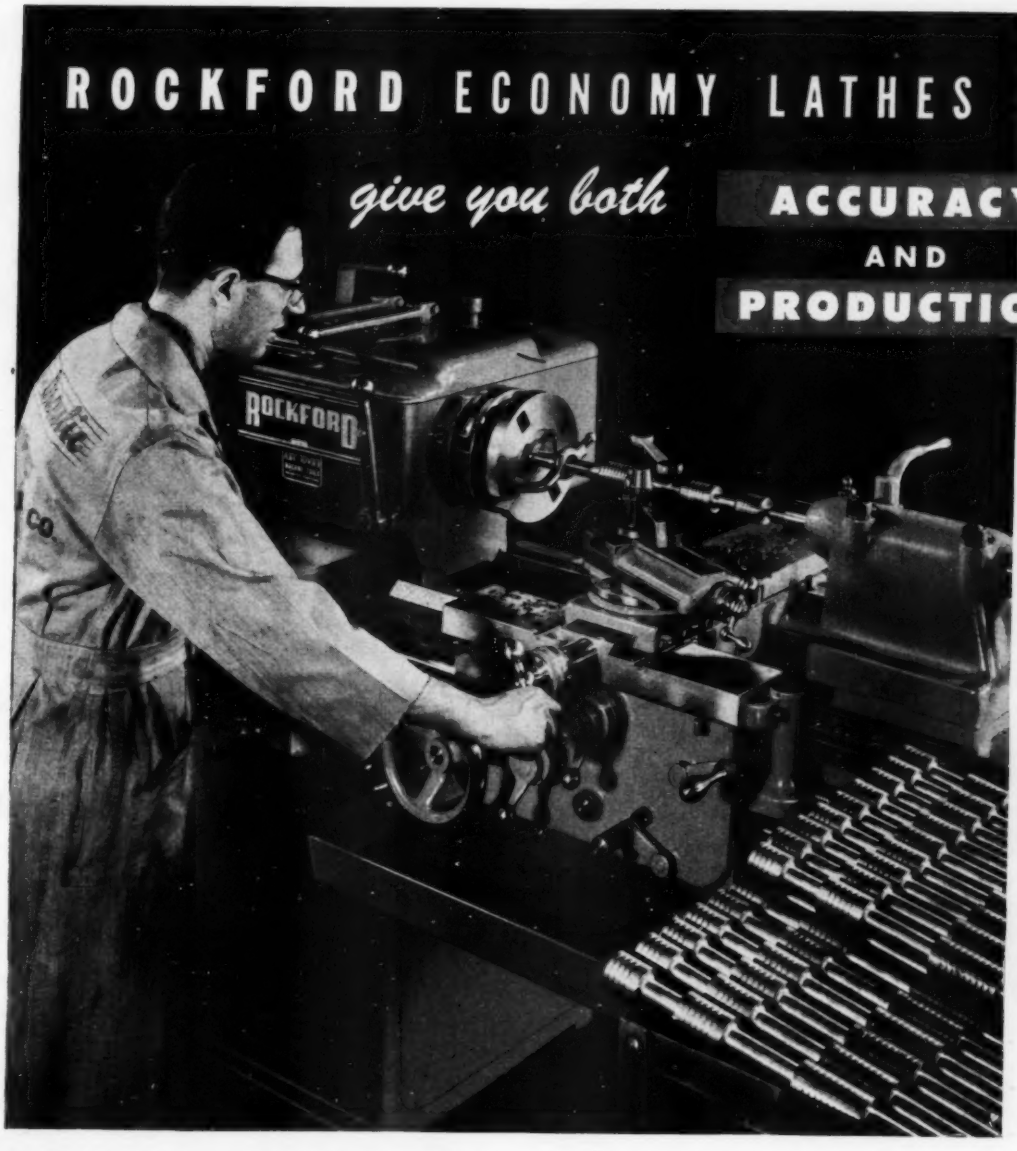
He leaves two sons active in the business, Richard H. and Howard M. Simpson. He is further survived by his wife, Pearl Howard, a daughter, Sarah Isabella (Mrs. Warner A. Johnson), and six grandchildren. — PAUL VAN WINKLE.

♦ DR. WILLIAM E. WARNER, professor of industrial arts, the Ohio State University, executive secretary and founder of Epsilon Pi Tau, International Honor Society for Industrial Arts and Vocational Industrial Education, presented the Laureate award and key to Professor Dwight W. Nichols, San Francisco State College.

(Continued on page 34A)

# ROCKFORD ECONOMY LATHES

*give you both* **ACCURACY AND PRODUCTION**




● Rockford Lathes are furnished with 2, 3, *or* 5 H.P. motors to give you power and speeds for heavy cuts or use of carbide tools.

A quick-change gear box provides carriage feeds from .004″ to .060″ and full range of threads from 4 to 56. Twelve spindle speeds are easily selected through convenient shift levers.

Tool room accuracy is a natural with the big, precision Timken Bearing Spindle. Heavily constructed tail stock is equipped with antifriction thrust bearings for ease of operation. Precision hobbed and shaved gears are provided in the headstock.

When you're buying Lathes, look for the *most* lathe, to give you *more* work. Ask a Rockford representative to give you the complete story on the *accuracy, production and economy* of Rockford Lathes.

MEDIUM-SIZED ECONOMY-PRICED

**ROCKFORD ECONOMY LATHES — 16″ and 18″**

SIZE

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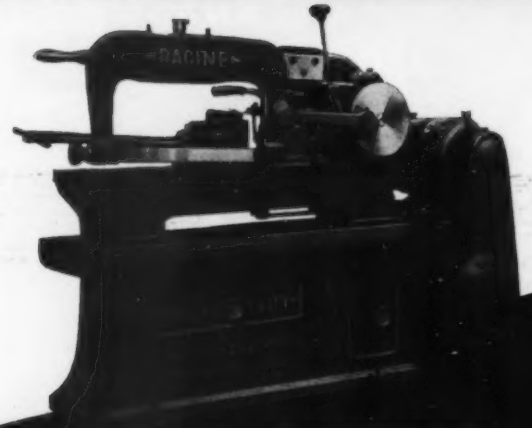
# IF YOU DO METAL SAWING IN YOUR SHOP...



## a RACINE "Utility" METAL SAW

...WILL
...SAVE TIME AND METAL
...DO THE JOB FASTER
...DO IT MORE ACCURATELY

One of the handiest machines in any institution or school shop. The "Utility" model is the metal saw so popular in large and small industrial shops used to augment high production, automatic metal saws. It is the perfect saw for general purpose, all around metal cutting work up to 6" x 6" capacity. Compact — hydraulically operated — fully guarded, a 15-year-old can learn to operate the "Utility" model in 30 minutes. Available in either Wet Cut or Dry Cut styles.

Other RACINE metal saws are available up to 20" x 20" capacity. Write us about your metal cutting work. Address Racine Hydraulics & Machinery, Inc., 2080 Albert St., Racine, Wisc.

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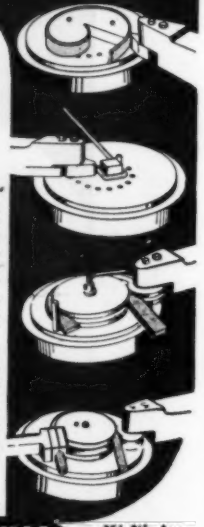
*by the originators of "Die-less Duplicating"*

This instructive and authoritative booklet will quickly prove itself indispensable wherever bending is done or is needed. It brings you a veritable gold mine of tested, authentic bending methods applicable to any rotary type bender. The proper bending technique may frequently offer a new approach to an old problem by simplifying product design and cutting production costs.

The exact methods of producing various types of bends in a wide range of materials are illustrated, step by step, with over 90 diagrams and charts together with valuable tooling suggestions.

*You'll want a copy . . . Mail your request today.*



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SAFETY STEEL STAMPS

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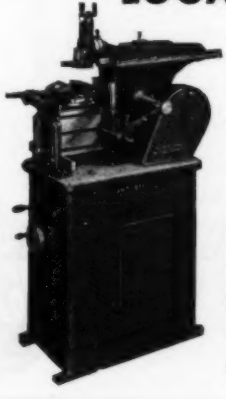
## LOGAN "955" 11" LATHE

The 955 equips the metal working teacher to train the student in every type of lathe operation. With 1" collet capacity, 1⅜" spindle hole, 11" swing and center distances of 24" or 36", this lathe handles sizeable work *accurately*. Less than .0005" spindle runout 12" from the bearing; and a two-V-way, two-flat-way bed precision ground to within .0005" maximum variation are typical of the tolerances to which it is built. The 45 to 1500 rpm speed range of the ball bearing mounted spindle permits all operations from roughing to high speed carbide tool cutting. Completely enclosed headstock, countershaft and motor means maximum safety for the student. The 955 is ruggedly built for hard school shop use. Its trim, compact steel cabinet is ideal for multiple installations. No other lathe of comparable specifications is comparable in low initial cost. Write now for full information.

**LOGAN ENGINEERING CO.**
**4901 West Lawrence Avenue, Chicago 30, Illinois**

## LOGAN 8" SHAPER



brings to the school shop the capacity, precision and versatility that make it a widely used industrial tool. Powerful 8½" stroke. Six automatic feeds in either direction, from .002" to .012". Designed for safety.

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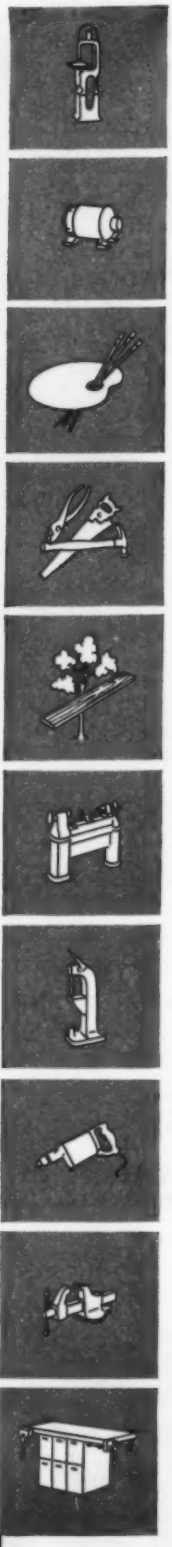

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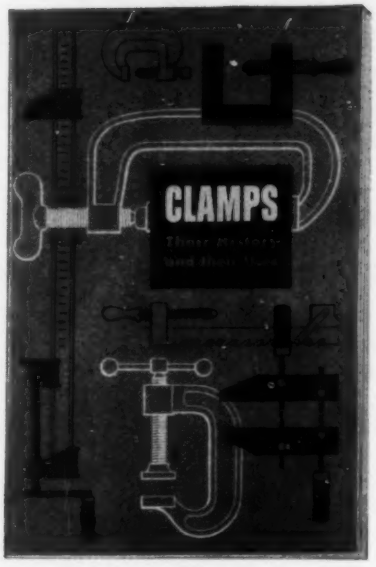


*Interesting*

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*Informative*

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**THE CINCINNATI TOOL COMPANY**
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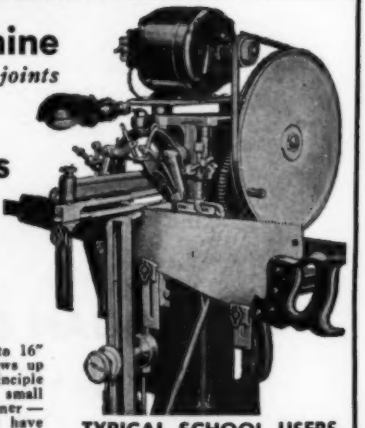
## SAW FILING

### This ONE Machine
*automatically files and joints*

### HAND, BAND, CIRCULAR Saws



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**30-DAY TRIAL OFFER**

You may have the privilege of using the Foley Saw Filer in your own shop for 30 days. Write or send coupon for details and list of school users.

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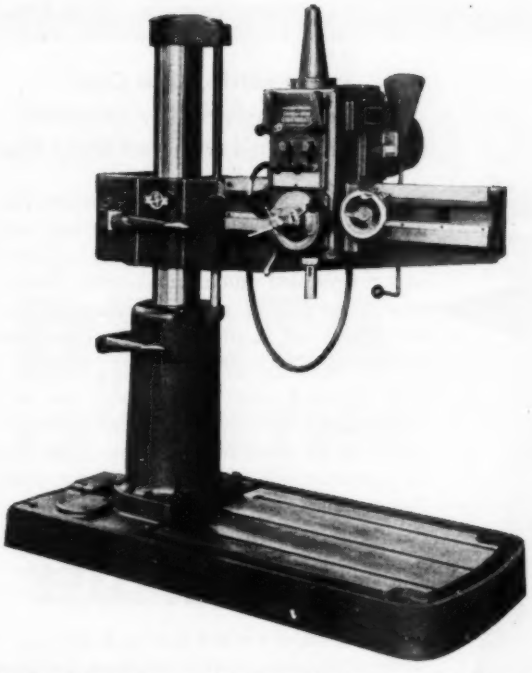
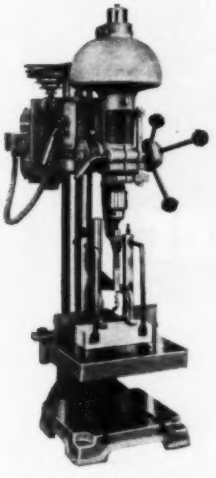
Please send full information on 30-Day Trial Offer and list of school users of Foley Saw Filers.

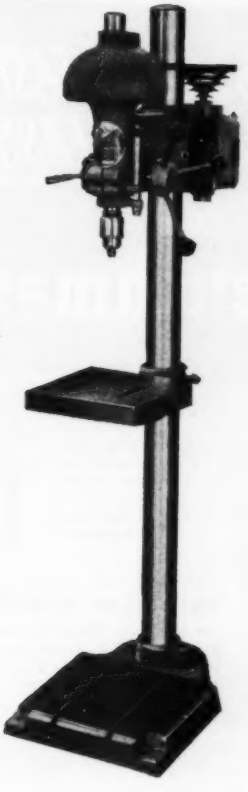
Name.....

Address.....

School.....







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New 3′ arm 7″ column medium-duty radial, widely used as a production tool in industry, is sufficiently low-priced to bring radial instruction to school and college shops. Drilling capacity up to 1″ in cast iron.

**C-O CINCINNATI RADIAL**—Here is a truly fine production tool designed to handle radial drilling up to 1″—a range which includes 90% of most industrial work. Low cost is combined with such high-priced radial features as: all geared head with 9 spindle speeds (30 to 1 overall ratio), 6 power feeds, flame hardened transmission gears, automatic pressure lubrication, all shafts mounted on anti-friction bearings, ground tubular steel column mounted on Timken tapered roller bearings, simple trouble-proof column and arm clamps, hardened and ground head rail on arm, heavy ribbed base with built-in coolant tank . . . Write for catalog D-121.

**C-O CINCINNATI ROYAL BENCH AND FLOOR DRILLS**—Quality construction throughout gives these 16″ and 18″ Royals sustained accuracy in long, hard usage. Spindle drive is "full floating." The spindle cone pulley is mounted on two ball bearings which prevent belt pull being transmitted to the spindle, which has upper and lower ball bearings to carry both radial and thrust loads of drilling. All four bearings have sealed-in lubrication and are ample in size to provide a margin of safety for both load and speed. Precision ground alloy steel spindle has six integral splines. The vee type pulleys are dynamically balanced for smooth running and minimum vibration.

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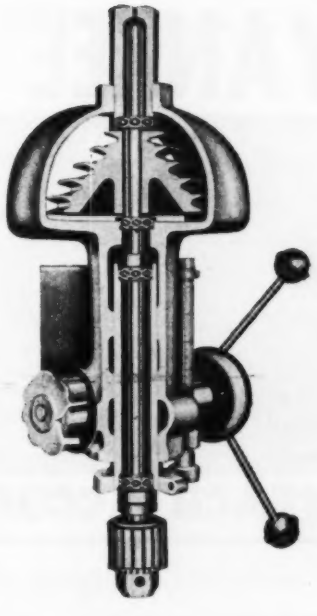
Write for catalogs D-118 and D-119.



Royal spindle head construction features four sealed-for-life ball bearings, adjustable clock type spring spindle return, and adjustable depth gage.

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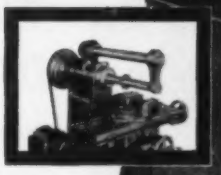
**Cincinnati 9, Ohio, U.S.A.**

Train students FASTER... train them EASIER— on a benchmaster

*Benchmaster converts from vertical to horizontal milling simply by exchanging spindle assemblies. Accuracy meets regular commercial machine tool requirements.*



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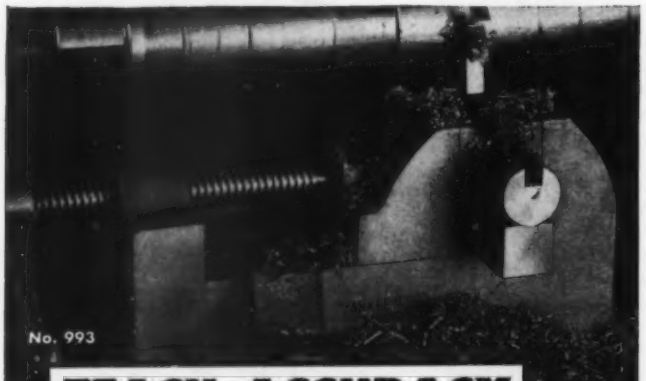


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*Start-to-finish work-holding encourages precision*

● Your work is always accurately lined up in a "Yankee" Vise. Carefully machined, on top, bottom, sides and front end for use in any position. Makes convenient, economical jig. For handling rounds, each vise is furnished with V-grooved, hardened steel block. Four sizes of "Yankee" Vises . . . 1½", 2", 2¾" and 4" jaw widths. Same sizes also available with detachable swivel base for bench use.

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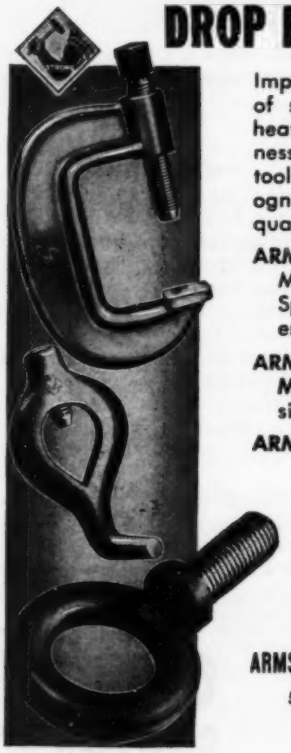

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# Students gain confidence — learn turning operations more easily

## ON THIS

# DELTA 12" LATHE

Your teaching job is easier with a Delta 12" lathe because it has everything needed to make turning a safe, simple, effective operation. *For instance:*

✻ **there's the SAFETY HEADSTOCK—complete enclosure of pulley and belt from front and top of lathe.**

✻ **there's the UNIVERSAL TOOL SUPPORT—heavy and substantial, it locks to the bed at any conceivable position or angle.**

✻ **there's the BUILT-IN INDEXING MECHANISM—two rows of holes in headstock pulley—one of 8, the other 60—allow work to be indexed at any position, at will, using one simple indexing pin.**

In industry, your students will be using this Delta 12" lathe—because it's built to industry's standards. It's a smooth running, long-lasting machine that "really can take it."

Spindle is carried on New Departure lubricated-for-life ball bearings—bearings are pre-loaded to eliminate play—assure a rigid, yet free-running spindle. Heavy, fine-grained cast iron bed is properly ribbed to provide the utmost in rigidity and accuracy. Rigid cast headstock body takes V-belt drive from either bottom or rear. Cast iron tailstock body has sub-base and provision for set-over of tailstock for center alignment and taper turning. 1¼"-diameter spindle is threaded on each end—accommodates different diameter face plates. ⅝" hole through center facilitates handling of long rod stock or No. 2 Morse taper geared chuck.

The Delta is available in two models—4-speed for wood turning and 16-speed for wood and light metal work.

*There's a Delta Power Tool for Every Job-*

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**53 MACHINES • 246 MODELS • MORE THAN 1300 ACCESSORIES**

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*GET THE UTMOST IN VALUE AND LASTING SATISFACTION FOR YOUR SHOP BUDGET BY CHOOSING DELTA TOOLS.*



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# IT'S EASIER TO TEACH accurate workmanship with the *Kalamazoo* METAL CUTTING BAND SAW

Model 610 cuts 6" round and 6" x 10" flat. Coolant equipment available.

That's why the Kalamazoo, so popular in industry, is used by so many schools.

Accuracy of a few thousandths is easy to maintain, whether cutting bars, rounds, angles or odd shapes. There's minimum kerf . . . no burr. What's more, the Kalamazoo is *safe* to use. Saw blade is almost completely enclosed . . . no exposed pulleys or gears.

Three sizes available. Each can be had with casters for complete portability. Send for full details *now*.

MACHINE TOOL DIVISION

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The stack molding technique, illustrated here, was made possible by using Sterling flask sections to step up casting production. Ten flask sections are being poured at a time. A common sprue through the stack feeds the molten metal to runners leading to individual castings cavities.

Sterling Steel Flasks are ideal for stack molding because they are built to withstand terrific pressures. A reinforcing rib around the side prevents distortion and misaligment of the stacked molds. Top and bottom have solid sand flanges. Full width bearing.

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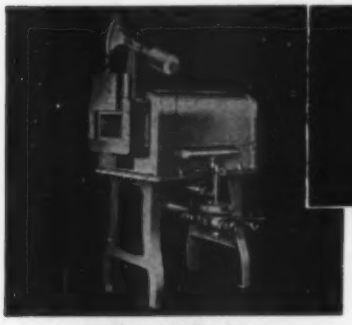
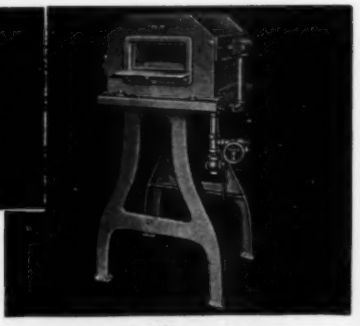
THE BEST INDUSTRIAL FURNACES MADE



*Small Semi-Muffle Oven*



*Small Forge*

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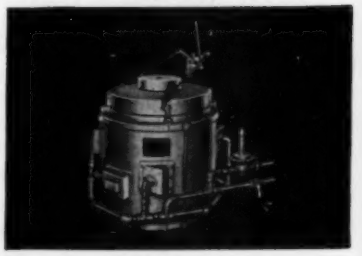
Because Sunbeam Stewart units have been designed for efficient production heat treating in small shops and tool rooms, they are widely recognized as standard equipment for all types of industrial heat treating and vocational training work. For student instruction and reference, write for our free "Guide to Furnace Selection." Aids in determining the type of furnace best suited for any work. Also ask for the new Data File on school units.

*Round Pot Furnace*



*Melting Furnace*

**SUNBEAM STEWART INDUSTRIAL FURNACE DIVISION OF SUNBEAM CORPORATION** (Formerly CHICAGO FLEXIBLE SHAFT CO.)

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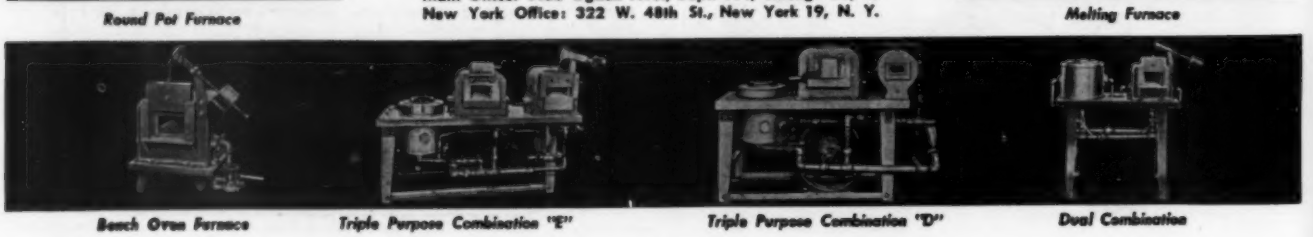


*Bench Oven Furnace* *Triple Purpose Combination "E"* *Triple Purpose Combination "D"* *Dual Combination*

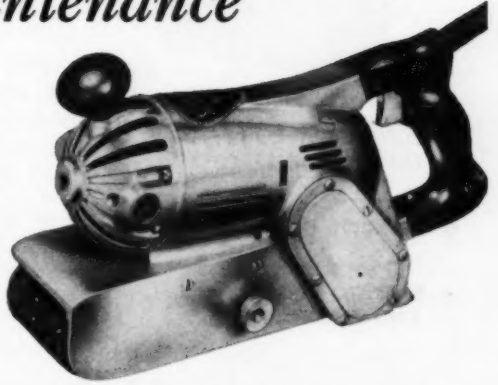
# SKIL

## Belt Sanders serve double purpose!

## *. . . for vocational training classes*
## *. . . for building maintenance*

What is more natural than to train students with the belt sander they will use as professionals! SKIL Belt Sanders produce faster work, finer workmanship. They are *school-and-job-proved* to give perfectly smooth finishes on all materials, whether wood, metal or composition.

SKIL Belt Sanders are designed for ease of handling and long life. In maintenance, they excel in refinishing cabinets, desks, blackboards and other school fittings. Cutting out tedious time-consuming hand labor, these SKIL Belt Sanders pay for themselves with the money they save.



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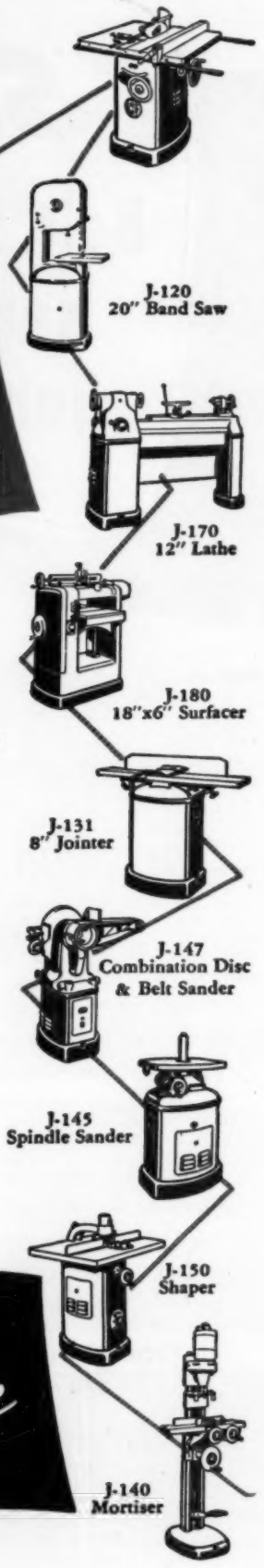

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INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

OCTOBER . . . . . 1952

# Student Planning a Teacher Responsibility and a Student Activity

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Student planning is a "method of approach" for the construction of a project. It is an activity which should be a vital part of every industrial-arts situation. The teacher *must* first understand this method which will be successful if he is interested in teaching students how to *think* rather than how to *imitate*. Many teachers will not attempt to provide for student planning because they resist change to something they do not understand, and then it might take too much time. Any new activity is time consuming until it becomes thoroughly organized.

Student planning has been neglected and kept out of many industrial-arts programs much too long. A great number of intelligent and progressive teachers have become cognizant of the importance of this activity and have realized that it is a daily occurrence in our everyday living.

The teacher should be the motivating factor in this planning activity. The responsibility for planning is not assumed wholly by the student. Therefore it is necessary to set up some very definite teacher *responsibilities:*

1. Provide for individual needs, interests, and abilities. This identifies itself partially with Morrison's first principle of his unit plan which is *exploration;* that is to discover the apperceptive base of the class. Then too the teacher must consider the needs which will lead to an interest.
2. Provide tools, materials, supplies, and equipment.
3. Provide instructional materials for wise planning.
4. Provide source materials for wise planning.
5. Provide *planning area* for students. Here Wilber states:

> Emphasis on planning as an important function of industrial arts focuses attention on the need for a place to carry on this activity. Experience seems to indicate that better results are obtained from planning, and that it is easier to encourage students to plan, when some definite area is set aside and properly equipped and organized for this work.[1]

The student should next be considered in terms of objectives for planning which is a functional educative process dynamic in every aspect of daily living. Planning objectives identify and lend themselves to the objectives of industrial arts as well as general education. Crull states this objective: "To meet each child on the level of his particular abilities and interests and give him opportunities in accordance with his needs."[2] Here it will be necessary to set forth some *objectives for planning*.

1. Learn to accept a problem, plan and organize for it, progress in it, and finally complete it.
2. Develop systematic procedure for obtaining information needed for specific problems.
3. Be able to make an understandable sketch or working drawing.
4. Develop an appreciation for good design and construction.
5. Be able to select suitable materials for a particular project.
6. Develop a *time sense* for projects.
7. Develop tactfulness in seeking information.

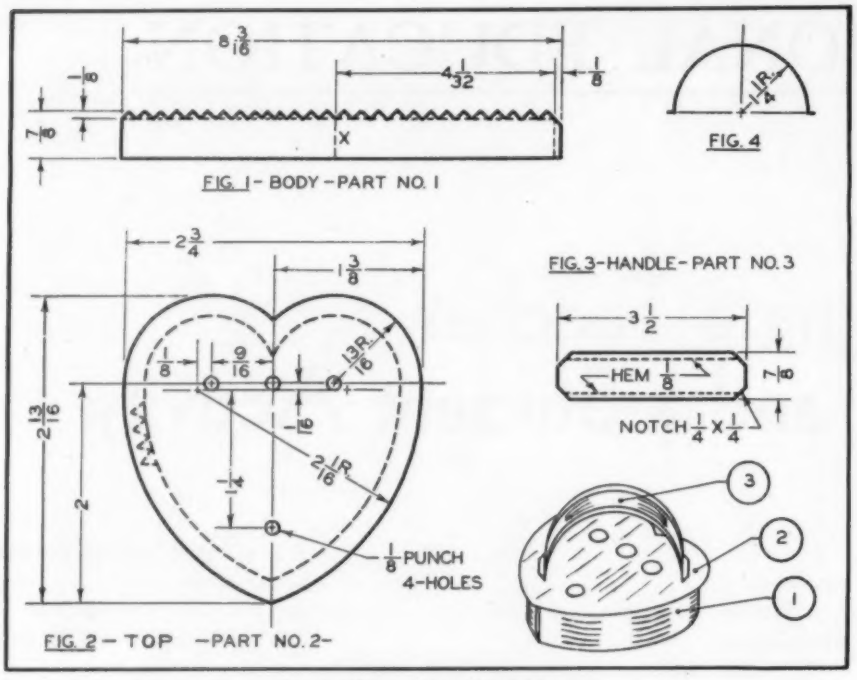
These objectives are but means of progress for the student; his activities and experiences are but steps of progress. In student progress there is student growth which will contribute to the end objectives of *general education.*

A guide for *planning* should next be provided for the student and the necessary information for its completion. The student will do a better job if he plans his scheme of approach for the construction of his project. The student plan sheet is written or completed by the student, not by the teacher. This gives the student a better understanding of it. The student surely can interpret his written instructions. Attached is a form which may serve as a guide for the content of a plan sheet. The plan sheet should include the following items:

1. *Procedure or how to make my project.* Here the steps should be listed in a plain and simple manner. The information need not be detailed or complicated. Remember, this is student made and student understood. There will be a greater interest in its fulfillment by the student. It will above all stimulate thinking on the part of the student and the instructor.

2. *Operations I need to know.* By listing the operations necessary for the construction of the project the student can readily check those operations which are new to him. The instructor can easily notice the operations which need to be demonstrated. This will prevent any overlapping and

[1] Wilber, G. O., *Industrial Arts in General Education*, International Textbook Co., 1948, p. 181.
[2] Crull, H. D., "A Community Plans Its Program for the Future," *The Nation's Schools*, Vol. 31, No. 5, May, 1943, p. 41.




**Heart shaped cookie cutter**

over demonstration which is often the case in some situations. This will also show the differences in experience.

3. *Tools and equipment I expect to use.* This is necessary because the student can check for himself and look at the tool panel and about the shop to see if everything is available. If any tools are not available it may be reported to the instructor. This may help the instructor in ordering new tools for the shop. Sometimes students have ideas which are much worth while and should be recognized.

4. *Safety precautions I must observe.* This is very important because we want to be sure the student is *safety conscious.* Prevention is the best cure. It will be necessary for him to work safely at all times. The student should list safety rules which apply to his particular project.

5. *Materials for my project.* This will help the student become material conscious as well as *cost* conscious. A catalogue may be provided to check the current prices for the various materials. This will very definitely make the student a better consumer of materials. Materials not on hand can be ordered.

6. *Estimated time and actual time.* The student should become time conscious and therefore should have the opportunity to decide *how long it will take him to finish his project.* Ultimately then *unfinished projects* will be the exception rather than the rule. Actual time should be recorded so that the student can check it against the estimated time.

7. *Suggestions by the instructor.* This is to serve as a check for the planning items listed by the student. The instructor should suggest changes in the selection of materials, etc., whenever it will make for better results in the construction of a project.

8. *Source information.* The student should list books, magazines, etc., from which ideas were taken for the project. A wealth of source information should be available to the student to help him *think and plan* intelligently.

9. *Sketch or working drawing.* The graphic representation should be a working means for the construction of the project. The sketch should be understood by the instructor as well as the student. The sketch need not be instrument drawn. The beginner should use a straightedge and pencil.

10. *The Project.* The student should answer some basic questions for the selection of a project: (*a*) Am I interested in making the project? (*b*) Do we have the materials and tools needed for the construction of my project? (*c*) Will it serve a need in my home? (*d*) Will I have enough time to finish the project? (*e*) Will I have enough money to pay for my project? (*f*) Will the construction of it challenge my ability? The project may be one suggested by the instructor or one chosen by the student.

*Planning effectiveness* will increase with the experience and growth of the student. Planning is a student activity as well as a teacher responsibility. The plan sheet should initiate student interest and thinking as well as provide for his needs, ability, and progress. If planning for a project is new to the students the teacher will have to start out by planning *with the entire class* and actually teach them *how to plan* and *why to plan.*

Is planning the same at all class levels? The answer is No. The effectiveness and the detailed completeness of planning will increase with the efficiency and maturity of the student. It might be concluded that as a *beginning experience* the student will need a lot of help and attention; as a *middle experience* the student will need some suggestions and supervision; and as a *final experience* the student should be able to plan effectively by himself. Anyone would need a great deal of help to participate in some activity new to him. Then too he would become progressively independent as he gained in experience.

### Methods of Planning

1. The beginning experience should be introduced by *indoctrination* to provide a basic background. The teacher should plan the first project with the class and proceed in a step by step manner, explaining and filling out each part of the plan sheet to be sure that the students know how to plan and why to plan.

2. The middle experience may be called *guided planning* in which case the student will have an understanding and a background of experiences. Here the teacher will act as a counselor to help the students with their special problems. Help should be given tactfully.

3. The final experience may be called *supervised planning* in which case the student accepts a problem or project and plans for it by himself. Here the student planning activity becomes a student responsibility. Schweickhard states: "Each project should represent a problem to be solved, for which the boy can work out his own solution by mapping out a plan of performance based upon his knowledge and ability and supplemented by instruction sheets."[3]

[3]Schweickhard, D. M., *Industrial Arts in Education.* The Manual Arts Press, 1929, p. 249.

**Student Planning Sheet**

*Name* Robert Skoff — *Instructor's Approval* A. C. Wenzel
*Estimated Time* 2 hours 30 min. — *Actual Time* 2 hours
*Project* Heart Shaped Cookie Cutter — *Date* March 7, 1951

*Source Information*
1. *Sheetmetal Worker's Manual* — Broemel
2. *Hand Processes* — Delmar Pub. Inc.
3. *Operation Sheets* — C.S.T.C.
4.
5.
6.

*Suggestions by Instructor*
1.
2.
3.
4.
5.
6.

*Sketch or Working Drawing*

NOTE: Use other side of sheet if necessary.

**Student Planning Sheet***

*Name* Robert Skoff *Class* Shop 2 *Section* C *Bench No.* 7

*How to make my project*

1. Lay out body as shown in Figure 1, then cut to size with straight snips.
2. Break grain of body using the slip roll.
3. Bend notches on body to 90-deg. angle on beakhorn stake.
4. Bend body to approximately 60 deg. on line shown at "X" in Figure 1 making sure notches are on the inside of the angle.
5. Form rest of body on conductor stake and use dotted line on Figure 2 as a pattern.
6. Solder body using ⅛-in. lap seam.
7. Lay out top as shown in Figure 2.
8. Cut to shape using combination snips.
9. Punch ⅛-in. holes as shown on Figure 2.
10. Sweat solder body to top.
11. Lay out handle as shown on Figure 3, then cut to size with straight snips.
12. Break grain of handle piece and make hems (set B.F. at 3/32 in. closed lock), then form handle on conductor stake as shown in Figure 4.
13. Sweat solder handle to top.

*Operations I need to know*

1. How to make layouts.
2. How to use tin snips.
3. How to make a lap seam.
4. How to solder.
**5. How to use the B.F.
6. How to form on stakes.
7. How to use the slip roll.

*This planning form was completed by a student in a sheet-metal shop class.
**Check (X) operations which are new to you.

*Tools and equipment I expect to use*

1. Combination square
2. Scriber
3. Prick punch
4. Dividers
5. Straight snips
6. Combination snips
7. Bar folder (B.F.)
8. Slip roll
9. Soldering copper
10. Stakes
11. Mallet
12. Hand punch
13. Gas furnace

*Safety precautions I must observe*

1. Be careful with hot copper.
2. Be careful when cutting sheet metal.
3. File smooth sharp edges.
4. Use first aid supplies for minor cuts.

*Materials for my project*

| *No. of pcs.* | *Description* | *Material* | *Size* | *Cost* |
|---|---|---|---|---|
| 1 | Top | 30-ga. tin plate | 2¾ x 3¾6 in. | ..... |
| 1 | Body | 30-ga. tin plate | ⅞ x 8¾6 in. | ..... |
| 1 | Handle | 30-ga. tin plate | 1⅛ x 3½ in. | ..... |

Total cost of project .....

There are possibly two other methods of planning which are used in some situations and in some cases by excellent teachers who unfortunately teach *projects* and not students.

1. One of these might be called *dogmatic teacher direction*. Here the students do not have to do any thinking or planning. The teacher tells them what to make and how to make it in a lock step manner with the emphasis on keeping the class together. This method is expedient for the teacher who wishes to make it easy for himself.

2. The other one might be called the *mental-verbal* method. In this case learning takes place by chance and in an incidental manner. This method is also expedient for the teacher who does not use instruction or planning sheets but keeps everything to himself mentally. The student learns by word of mouth instructions.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## RENEWING GUMMED-UP SANDING BELTS


**R. L. GRANDLE**
East High School
Wichita, Kans.


Sanding belts for portable electric sanders are usually gummed up rather than worn out, especially if they have been used on pine wood. To avoid this, wash them occasionally with a small cloth saturated with common lacquer thinner. This will make them about as good as new again, and they will continue to render service until worn out.

Lacquer thinner will also remove the gum on circular saw blades, and make them cut much better, and they will be much easier to sharpen.

The typical American school tests eyesight only with a chart read at 20 feet, but the child does most of his school work at 15 inches and requires many visual skills that no chart alone can test. — *Dr. Carl F. Shepard,* Chicago optometrist.

# Shopwork for Industrial-Arts Teacher Training

**RALPH E. STUCKI**
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Shopwork can be the most invigorating phase in the training of industrial-arts teachers or it can be considered as an insignificant part of the curriculum. Since, however, the prospective teacher will most likely teach shopwork, it should be the most important aspect of his curriculum. Shopwork should be not only to learn skills with tools and the planning of a project, but also, to learn some practical parts of many of the professional courses. It could serve as the core around which the other professional courses are coordinated. While courses in shop organization, methods of teaching, instruction sheets, safety, trade analysis, and testing, are important, these can be brought together in a shop course which has, from the student's outlook, a more practical meaning. The student will be able then to see how some of the theory is put into practice. If instruction sheets are not used in the shop classes, the student does not see the value of them. However, this alone is not enough. The student should write some instruction sheets for each class while he is a participant in that shop class.

Much has been written about the selection of projects for high school students. Naturally, the projects cannot be as difficult as those a college student could make. Some practice in selecting and making high school projects should be done; so that in the first year of actual teaching, the teacher will not suggest projects which only he can make. After the construction of projects, student trainees can decide if a wise selection has been made.

A certain amount of emphasis should be placed on techniques with tools for boys of the junior and senior high school level. Biomechanics, the study concerned with human engineering is just as important for high school shop students as for adult workers in industry. While telling students how a certain process is best taught to others, and teaching the same process to the prospective teacher seems to be a more effective way of *putting the idea over* than to speak about it abstractly in a *methods course*. A much more effective method is to teach the process to the trainees in the beginning.

### What to Know About Each Shop Area

Some items a prospective teacher should learn for each shop are:

1. *Techniques with tools:* This can be learned only in shopwork. A reasonable ease in working with tools should be acquired, not necessarily the craftsman style. While craftsmanship is an important asset for the industrial-arts teacher, a good craftsman cannot be made in a few weeks nor by working in industry for one or two summers. Trade knowledge and skills are cumulative and are most easily acquired and absorbed during the adolescent and early adult period of life.

2. *Ordering supplies, tools, and machines for each particular shop in which work is taken:* This, perhaps, is the most important item that a beginning teacher needs to know. Accurate and exact specifications for materials and all equipment always result in better service and satisfied customers.

3. *Good junior and senior high school projects:* From the pupil's standpoint, the project is the thing. The student in teacher training should have plans, pictures, and job plans for many projects that are neither too difficult nor too easy for the high school pupil.

4. *A workable personnel organization:* Among the several shop classes taken, the prospective teacher should have been cognizant of several types of personnel organizations, and have practical experience in the administration of several kinds.

5. *How to write related information so that a high school student will understand it:* This information should be written while the student is most interested.

6. *How to use operation, information, and job sheets:* This should include the practical use of sheets and also the writing of demonstrations made in the shop. A first-year teacher has little time to do research work before teaching a certain technique with tools and likely will not have many sources of information. The following written work should be prepared:

*Demonstrations:* Tools and materials required, steps in the procedure, several questions on the demonstration, two or three references.

*Related information:* A page in outline form about each topic, several questions about the information, two or three references.

*Job sheets:* Write the job sheet and make a plan of each project constructed that could be used in practice teaching and later teaching.

7. *Visual aids:* There are many different visual aids in each shop which students could make that would be of value during the first year of teaching.

8. *Shop maintenance and care of tools:* A shop teacher will have to do much of his own maintenance work and certainly make all minor adjustments on machines. The college student should learn among other things in his shop training: how to file and set saws, dress grinder wheels, replace bushings, put brushes in a motor, and sharpen drill bits.

9. *Safety:* This is such an important phase of all shopwork that it is hard to see how any work can be done without teaching safety pointers for each machine.

Although more careful supervision on the part of the shop teacher trainer is required, students also can give some of the demonstrations and related information lessons. To aid the student further, a check list of good and poor points should be handed to the student at the end of his lesson. Some observation of teaching should begin in at least the sophomore year for all students to be followed by supervised student teaching in the junior and senior years. Participation in some short teaching activities is good student observation. It will help to make the student more *teacher conscious.*

The student should be trained so that he is prepared to teach rather than to have a knowledge of specialized skills only. A person imbued with the desire to impart the best kind of knowledge will become more proficient in the specialized skills which cannot be learned in a short time. The freshman teacher must have a kit of teaching devices for each of several shops for he never knows in which areas of industrial arts he will actually teach. Many of these devices, aids, and techniques are peculiar to one shop. They can be more easily obtained when in shopwork.

This type of shopwork requires a teacher trainer who is not far removed from a functional high school teaching situation. It will be necessary for him to keep up to date and practical in dealing with boys and girls of the junior and senior high school age.

# Industrial Arts for the Handicapped

**HARRY A. STURGES**
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Industrial arts can play an important role in aiding the handicapped on all academic levels obtain a sense of pride and accomplishment in their work that very few other courses can give.

Figure 1 shows a youth who is enrolled in the metal shop program of Ravena-Coeymans High School. When he was in the sixth grade he lost his right arm and had a whole new life unfold before him.

Fig. 1. Projects made by a handicapped youth

Many of the things he had learned he had to forget, while many other things came up that he had to learn over again for the first time. By his own admission the industrial-arts program played a great role in aiding him to become once again a normal student.

Figure 1 shows him with some of the projects that he developed in the shop using the various tools, techniques, and practices. Many processes come up while he is making a project, that are very hard for him to deal with under his handicap, but with perseverance and a strong desire to do the job on his own, comes the foresight to meet each challenge. With each new project come new problems and with every problem that he meets comes a firm understanding and knowledge that may aid in the completion of undertakings in various unrelated problems of the future.

Handling of tools is one of the major adjustments that the boy had to make as far as the shop program went. At first, many of the tools were very difficult to handle and many times the youth began to feel he was licked. But after many unsuccessful attempts, after many pieces of ruined work, and after hours of thought and practice the problem was always solved to his satisfaction. The main aid in his shopwork was found to be the vise. It became his other arm. With the aid of this tool many other tools became much easier to handle.

Figure 2 shows him boring with the bit and brace. Using his shoulder for applying the downward pressure and turning the handle with his left hand he can do a very successful and accurate job.

Shaping metal on the anvil is a hard job for anyone to do. This youth does a satisfactory job by allowing the hammer handle to rest on his arm and supporting it with his armpit. The only weight that is applied is the weight of the hammer

Fig. 2. Using the brace and bit

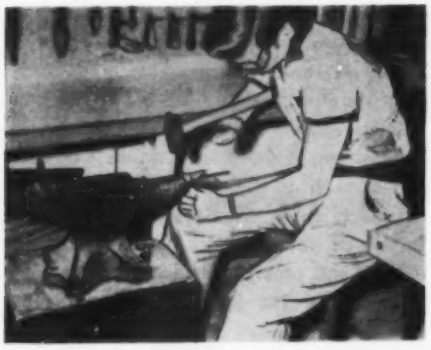

Fig. 3. Shaping wrought iron with the hammer

head as it drops, but many operations can be done this way. In Figure 3 this method is illustrated as the boy works on a wrought iron project.

Figure 4 shows the boy working in the shop using some of the power tools and performing some of the processes that are expected of normal students.

Industrial arts provides an opportunity for the handicapped youth to explore industry in a search for his proper place as one of its producing workers. It gives him an opportunity to acquire related information and perform actual industrial processes in order to determine which industry he will find himself best suited for.

Vocational interests may be developed providing an outlet for expression during leisure time. Outside hobbies such as model plane building and sketching give the student an opportunity to create and develop hand dexterity along with shopwork.

An interview with the student brought up some points that may aid other handicapped youngsters who are skeptical about entering the industrial-arts program. They are as follows:

1. The creation and building of projects in the shop proves that, with a little extra time and patience, the handicapped can do as well in shop as the other students.
2. The skills developed in the shop program help the handicapped students to gain confidence to face and defeat obstacles that may come up in the future.
3. The shop program teaches him many complicated processes and gives him experiences that he can use in his everyday life.
4. It aids him in obtaining a feeling of self-sufficiency and proves to him that he does not always have to rely on others.
5. Above all, industrial arts gave this handicapped youth a desire to continue in the face of many obstacles to become a well-rounded, well-adjusted student.

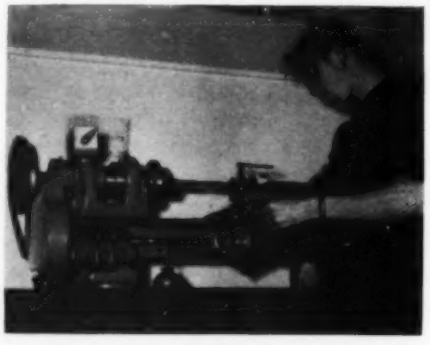

Fig. 4. Operating power tools

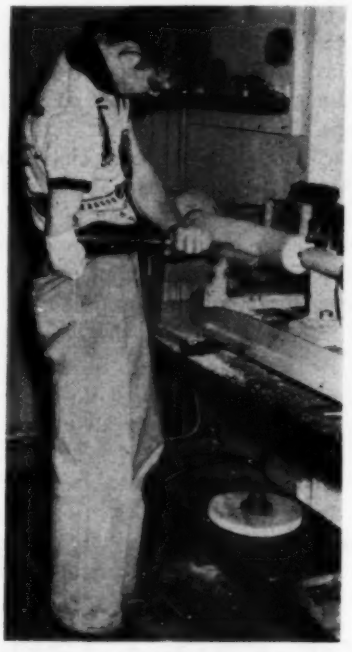

Fig. 5. Working at the lathe

# Learning By Doing at Michigan State

**GLEN C. COOK**
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One of the basic philosophies in the training of teachers of industrial arts at Michigan State College is to give the students an opportunity to develop abilities essential to successful teaching. In order to develop these abilities certain changes of behavior must be brought about within each individual preparing to teach. Numerous methods may be used in developing these desired changes within the student.

*Learning by doing* is recognized as being one of the most effective ways of bringing about desirable changes within the learner as a result of the instruction. Consequently every effort is made at Michigan State College to prepare the students to perform the kinds of activities they will have to teach in the industrial-arts program.

The question arises how can a curriculum be developed which will provide opportunity for students to learn by doing the kinds of activities they will need to know how to perform effectively? The plan followed at Michigan State College was to visit a number of departments of industrial arts in the state and to find out what activities were included in the local programs. These data were collected by personal observations and individual conferences with teachers and school administrators. The next step was to develop a curriculum which would provide for the training of teachers in these activities.

Another question which may arise is how to get college professors to teach the kinds of activities teachers need and to provide adequate opportunity to *learn by doing?* This has been accomplished in this institution by personal conferences with individual professors of the courses and explaining to them the kind of subject matter needed and the activities to include in the laboratory. In some instances it has been possible to take professors out to visit industrial-arts programs in operation.

L. C. Adams, supervising teacher, uses the conference procedure in discussing topics in the methods course. This same procedure is used in planning and working together

Supt. M. F. Egdorf of the East Lansing high school discusses with the student teachers the school program. This is an important part of their orientation and induction into the training center

In other cases it has been possible to employ former teachers of industrial arts as college instructors. Pictures of activities and projects completed in local schools have also been shown. All of these methods have been found helpful in developing an understanding of the job of the teacher of industrial arts.

Another way used in getting the courses at the college taught on the basis of individual interests and needs is through various techniques used in evaluation. Each college teacher is evaluated by the students enrolled in his course. This is achieved through the use of the college teacher rating scale and personal conferences with the students. Each teacher is also encouraged to make a self-evaluation of his teaching and to develop ways and means of improving his instruction.

The real test of the instruction is revealed through the student's teaching in the supervised teaching center. This is the place where the student teacher has an opportunity to demonstrate his ability in performing the jobs he is expected to know how to teach. If he cannot do certain jobs adequately the question arises as to whether it is due to lack of student ability or to a lack of opportunity to receive sufficient training through learning by doing in college courses. If the latter is true the college professors of the courses concerned are contacted and the problems discussed.

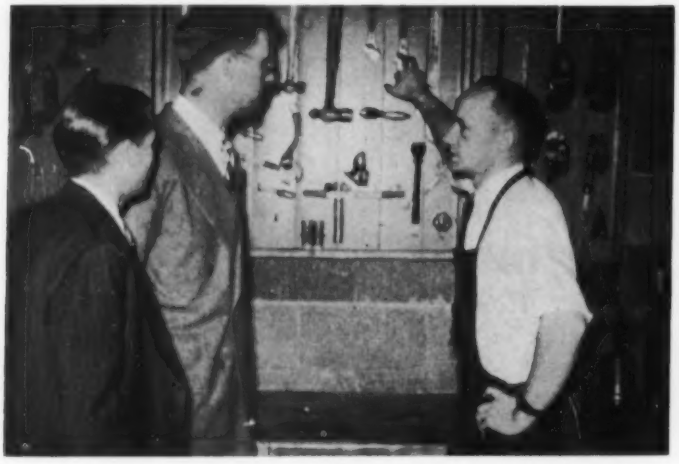
### Unique Student Teaching Program

The program in student teaching in industrial arts is unique at Michigan State College in a number of ways. The student teachers spend a full term of 12 weeks in the training center in the East Lansing high school. They are expected to be at the school in the morning at the same time as the regular teachers and to remain there during the full teaching day. In other words they are treated the same as the regular teachers in the school. Likewise they must realize that it is their duty to assist with the school activities the same as the other teachers.

The student teachers are also expected to participate in evening meetings at the school. This is made possible since they live in the community. These experiences in addition to student teaching are all necessary in developing student abilities in the kinds of activities they will have to engage in as teachers. These experiences are also helpful in developing a realization

Teacher-pupil planning is emphasized in building the course of study and planning of activities

The student teacher carefully checks the plans being made by the pupil



Student teachers discussing tool storage with Clayton Johnson, industrial teacher at Morrice, Mich. One of the activities included in a field trip to other industrial-arts departments

The student teacher carefully supervises and teaches pupils at work in the shop

of the job of the teacher of industrial arts.

The methods courses in industrial arts are taught in the student teaching center. These two courses comprise a total of 8 term credits. In addition to these credits the students receive 8 credits for student teaching. This makes a total of 16 credits in education the students receive for their full off-campus term of activities in the training center.

The methods courses are taught in the training center by the resident teacher trainer and the local supervising teacher. The resident teacher trainer goes to the training center twice a week to observe the student teaching and to teach the topics which have been assigned to him to teach in the methods courses. The high school schedule is so developed as to have at least one free period per day for teaching the methods courses. Two of these days are used by the resident teacher trainer and the remaining three by the supervising teacher in conducting these courses.

The teaching of the methods courses, while the students are in the training center, has proved to be very desirable as it provides opportunity for the discussion of jobs and problems just prior to the time they will be performed by the student teachers. At this time the teachers are interested and have need for the instruction. Consequently very little motivation is necessary. Another reason for teaching the methods courses in connection with the student teaching is to make possible a full term of off-campus activities in the training center. Prior to going to the training center the student teachers have completed a minimum of 14 credits in education.

The major objective in the training of student teachers in the local center is to provide opportunity for the student teachers to participate in and to develop satisfactory abilities in doing the kinds of jobs they will have as teachers. Consequently every effort is made to have the teachers *learn by doing* a variety of activities.

### Teacher-Pupil Planning Stressed

The teacher training staff is cognizant of the need for teacher-pupil planning of activities and working together. Each student teacher is asked to develop a list of his objectives in student teaching, in other words what he hopes to accomplish and how he proposes to achieve this. He is then asked to develop a list of activities in which he would like to have experience. The student lists are then discussed by the students and the teacher trainers and compared to the list prepared for student teaching by the teacher training staff. In this way the student teachers have a part in planning for *"learning by doing activities."*

Each student is furnished with the check list of activities which he has helped develop. After the student completes an experience he places a check ($\surd$) in the space provided. He also checks the degree of his achievement which may be stated as 1, 2, or 3 meaning that the experience was fully accomplished, partially achieved, or unsatisfactory.

Each student teacher also has a part in the planning of the kind of activities he should include in his daily diary. This helps the teacher to realize why a daily diary of his experiences is valuable to him and suggests to him the kind of records to keep of his daily achievement. This diary is also valuable to the supervising teacher and the resident teacher trainer in evaluating the training program and pupil achievement.

### Field Trips

During the term the resident teacher trainer accompanies the student teachers to at least three industrial-arts departments. This gives the students an opportunity to see facilities in other schools, visit classes in operation, and observe shop management procedures used by other teachers. It also provides opportunity for the student teachers to discuss with the local teachers their programs of instruction.

Whenever possible the student teachers are given the opportunity to attend local, state, or national meetings in industrial education. Following these meetings each teacher gives a report of the sessions attended and his evaluation of the conference. He may also suggest certain activities or ideas gained which he plans to include in his program of instruction. In all instances the students are encouraged to collect any bulletins, equipment catalogs, visual aid lists, and the like that are available for distribution.

Many opportunities for developing abilities essential to effective teaching have been suggested in this article. All of them emphasize the idea of *learning by doing*.

# Leaders in Industrial Education

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(*Continued from page 221 of the September, 1952, issue*)

### A Change of Attitude

It seems likely that Dr. Prosser's strictures on manual training were based upon his reading of the report of the first Douglas Commission, rather than upon firsthand study and observation of industrial-arts departments in the more progressive schools. At any rate, Prosser's early visits to the middle west were remembered longer for his criticisms of industrial arts in the public schools, which were generally considered to be unwarranted and undeserved, than they were for his more constructive remarks on vocational education. In later visits he gave evidence of a change of attitude, and his addresses and conferences were more effective.

### Relation to General Education

In this connection it may be appropriate to anticipate the unfolding of events by observing that Dr. Prosser's vigorous advocacy of vocational education sometimes led him into the making of remarks about its relation to general education that were not warmly received by superintendents, principals of schools, and others interested in general education. His attitude toward general education sometimes alienated the support of influential leaders who might have contributed more than they did to the cause to which he was devoted. His pronouncements concerning the past failures and current inadequacies of the public school system, often caustic, made it difficult to secure the hearty cooperation of general educators, and undoubtedly delayed the consummation of the vocational education movement. Many leaders in general education deprecated the divisive influence of the appeals of the advocates of vocational education, and as the years passed Dr. Prosser was invited with less and less frequency to address national and state conventions of general educators.

### Tryout Experiences

I learned about one of the reasons for Prosser's change of attitude with respect to industrial arts several years later, about 1919 or 1920 I think, when I paid a visit to Dunwoody Institute in Minneapolis. Dr. Prosser took me in hand personally and showed me around the plant. With especial pride he showed me one department which consisted of a series of shops, one to represent each of the major divisions of the Institute. Formerly, he explained, Dunwoody Institute followed the practice of enrolling each incoming student in the shop or department of his choice. It was observed, however, that many students came with very inadequate background or basis for making these choices. In some cases the young man would discover after several months that the work of the chosen trade was not what he thought it was; another would find out that he did not have the requisite foundation work in or liking for mathematics to succeed in his chosen trade; another lacked sufficient background in science; and so on.

The shifting about from one department to another caused great loss of time and expense and disappointment to the students, as well as serious waste of time and money on the part of Dunwoody Institute. To aid in correcting this evil, the faculty organized this series of tryout shops, and at the period of my visit the entering student was expected to spend six weeks in each shop, and to take a series of aptitude tests. After completing this round of experiences, he was encouraged to make a choice based on the results of his shop performances, and of the tests, and of interviews with his successive instructors. The adoption of this policy resulted in marked reduction in the number of misfits and changes in basic plans.

Ultimately someone called Dr. Prosser's attention to the fact that if the public schools generally maintained effective departments of industrial arts, and if Dunwoody Institute would accept only candidates who could show that they had successfully gone through the experiences of a well-organized and capably administered program of industrial arts, it would not be necessary to maintain this expensive series of tryout shops. At any rate, his attitude changed. And later I heard him on at least two occasions on convention programs, emphatically and publicly, declare that a sound and properly administered system of industrial arts provides the best possible foundation upon which to build a successful program of industrial education.

Further significant evidence of this change of attitude came with the publication of the report of the Minneapolis Survey,[3] which was made during the year 1915. Dr. Prosser served as chairman of the local survey commission, and as director of the survey. The report recommended reorganization of the elementary schools so as to provide a wider variety of manual activities for all children, and prevocational courses in the upper grades. "The findings of the Minneapolis survey, and the discussions of the convention, left no room for doubt that the Society now recognizes the important contribution which the manual arts courses in the high schools may make directly to genuine industrial education."[4]

Later in that same year, 1916, Dr. Prosser and the late Wilson H. Henderson, then professor of industrial education, University of Wisconsin, conducted the vocational education section of the

[3] *Report of the Vocational Education Survey of Minneapolis.* Bulletin No. 21. National Society for the Promotion of Industrial Education, New York, January 1, 1916.
[4] Editorial, *Manual Training and Vocational Education Magazine*, Peoria, Ill., Mar. 1916, p. 553.

survey of the public schools of Denver, Colo., which was sponsored by the Denver board of education in co-operation with the Colorado Taxpayers' Protective League. In the report on vocational education,[5] Prosser and Henderson recommended that, in the manual training work of the seventh and eighth grades, the prevocational aim should be emphasized, and that a much greater variety of tools, materials, and processes should be introduced into the shopwork. They also recommended that shop teachers be sought who have had some practical industrial experience, and who would take an interest in boys and their problems.

### Merger of General Education and Vocational Education

An even more striking expression of this change of attitude is found in the record of the steps taken to abolish the Federal Board for Vocational Education.[6] During the 16 years of the first period of the existence of the Federal Board, 1917–33, there were "several attempts to merge the work of the Board with general education. Some of these were concealed in bills intended to provide federal aid to education." These attempts were successfully resisted by the forces supporting vocational education.

During the depression that followed the crash of 1929 insistent demands were made for reduction in federal spending, and under an Act of Congress of June 30, 1932, the President was given authority to reorganize the government departments and independent agencies. "The Act provided that such executive orders would not become effective until sixty days after being promulgated, unless the Congress shall in the meantime approve them."

On December 9, 1932, President Herbert Hoover issued an executive order transferring the powers and duties of the Federal Board for Vocational Education to the Department of the Interior. Congress did not approve this transfer during the sixty-day interval, and the order did not become effective.

On June 10, 1933, President Franklin D. Roosevelt issued an executive order transferring the duties and functions of the Federal Board to the Department of the Interior; and on October 10, Secretary Harold L. Ickes issued an order assigning the duties and functions of the Board to the Commissioner of Education, who was "directed to proceed with the necessary reorganization of the Office of Education." In the reorganization the title of the Director of the Federal Board for Vocational Education, at that time Dr. John Calvin Wright, was changed to Assistant Commissioner for Vocational Education.

On May 16, 1946, an executive order was promulgated by President Harry S. Truman, designated "Reorganization Plan No. 2," in three sections. Section 2 of this plan provided that "the Federal Board for Vocational Education and its functions are abolished."

Characterizing these executive orders as "steps backward in education," the authors of *Development of Vocational Education* make a spirited defense of the traditional American ideal of public education administered by boards of education made up largely of nonprofessional members. Instead of abolishing the Federal Board for Vocational Education, the authors declare, "it would have been much more consistent with our whole philosophy of educational administration to have created a Federal Board of Education into which the functions of both general and vocational education could have been merged."

Unfortunately this concession came too late. For well over half a century educational reformers have advocated the creation of a Federal Board of Education, which would be charged with the Office of Education from the influence of partisan politics. It seems possible that this consummation might have been brought about by the co-operation of the vocational education leaders with the general education forces at the time when federal legislation for vocational education was in process of formulation. It could not be accomplished so long as the former were determined to keep the members of his staff, and the complete elimination of the responsibility of appointing the Commissioner of Education and the movement "independent of general education."

### The Staten Island Conferences

Although Dr. Prosser served as secretary of the National Society for the Promotion of Industrial Education for only three years, 1912–15, these were extremely busy, eventful, and fruitful years. Within the limitations of this sketch it is impossible to deal with more than two or three of the outstanding achievements of Dr. Prosser's administration. During these three years, and for some time thereafter, the National Society maintained an office on 42nd Street, in New York City. From September, 1912, to June, 1914, I was a graduate student at Teachers College, and during that period I was in Prosser's office frequently, because of my interest in the activities of the Society and in the progress of the movement.

One of the significant contributions made by Dr. Prosser during his term as secretary of the National Society was his calling of a series of conferences of industrial education leaders, for the purpose of making an intensive study of certain problems of common interest, and more especially problems of state legislation. To suggest something of the significance of these conferences just at this time, it is important to recall the circumstances and to call the roll of the leaders of that critical period.

Following the enactment of the first state law providing for the encouragement and financial support of industrial schools, Massachusetts in 1902, events moved rapidly, and by 1912 considerable progress had been made. At that time it was recorded that "six states now have in operation definite systems for organizing and supervising vocational schools and for assisting local communities in the maintenance of such schools through grants of state aid . . . Massachusetts, New York, New Jersey, Pennsylvania, Wisconsin, and Indiana."[7] In each case specific machinery had been set up for the administration of these systems of vocational schools, and the staff of each state department of education included one or more persons charged with the responsibility of supervision.

### Initial Leaders in the States

Following is the list of leaders chosen for the initial experiments in the states indicated:

*New York.* Although state legislation was enacted first in Massachusetts, the first state director of vocational education was Dr. Arthur D. Dean, in New York, who was appointed in September, 1908. Members of his staff included:

Layton S. Hawkins, specialist in agricultural education, appointed on July 1, 1912. He later served four years as state

[5]Charles A. Prosser and Wilson H. Henderson, A Study of Vocational Education in Denver. Part III. *Report of the Denver School Survey*, May, 1916.
[6]L. S. Hawkins, C. A. Prosser, J. C. Wright, *Development of Vocational Education*, American Technical Society, Chicago, 1951, pp. 156–161.
[7]Bawden, Progress in Vocational Education. *Report of the Commissioner of Education*, for the year ended June 30, 1913, Vol. 1, Chap. 11, pp. 247–276. Government Printing Office, Washington, D. C.

director of vocational education, and later as a member of the staff of the Federal Board for Vocational Education, including three years as director, 1918–21.

Lewis A. Wilson, specialist in industrial education, appointed on October 1, 1912. He later served as director of the division, assistant commissioner of education, and for nine years as deputy commissioner of education. In 1950, he was appointed State Commissioner of Education.

*Massachusetts.* As previously indicated, the program in Massachusetts was inaugurated by Dr. Prosser in 1910, and he was succeeded by Allen, who was in charge for one year 1912–13. At the time under discussion Dr. Robert O. Small was deputy commissioner for vocational education, appointed on August 1, 1913. Other members of the staff included:

Charles R. Allen, state agent for industrial education, appointed on March 1, 1911.

Dr. Rufus W. Stimson, state agent for agricultural education, appointed on March 1, 1911.

*Pennsylvania.* Millard B. King, assistant state superintendent for industrial education, appointed on December 6, 1911.

Lindley H. Dennis, assistant state superintendent for agricultural education, appointed on December 6, 1911. He later served 13 years, 1920–33, as state director of vocational education; and 16 years, 1934–50, as executive secretary of the American Vocational Association, with offices in Washington, D. C.

*Wisconsin.* Warren E. Hicks, assistant state superintendent for industrial education, appointed on June 1, 1912.

*New Jersey.* Lewis H. Carris, assistant commissioner for vocational education, appointed on January 1, 1913. He later served five years as a member of the staff of the Federal Board for Vocational Education, including one year as director, 1921–22.

*Indiana.* Dr. William F. Book, of the State Univerity of Indiana, appointed state supervisor of vocational education, on June 1, 1913.

Z. M. Smith, of Purdue University, appointed state supervisor of agricultural education, on June 1, 1913.

It is important to note that Dr. Prosser had worked with all these men individually on problems arising in the several states, and he now conceived a plan to call them together under circumstances that would provide opportunity for more extended and concerted deliberation. During his term as superintendent and legal adviser for the Children's Aid Society in New York City, 1909–10, he became acquainted with one of the facilities of that Society, namely, the Goodhue Estate, on Staten Island, which was used for outings and as a vacation home for children and teachers. It was a fine old mansion, set in a wooded park of 25 to 30 acres, and it afforded ample facilities for housing, entertainment, and recreation. The Society placed the home at the disposal of the conferences, complete with rooms, meals, meeting place, and necessary service, at a very nominal charge.

In addition to members of the staffs of the several state departments of education, named above, Dr. Prosser invited the following men to join in the discussions:

Wesley A. O'Leary, director of the Industrial School at New Bedford, Mass., appointed in September, 1908. Later he was for many years assistant commissioner for vocational education, State Department of Public Instruction, Trenton, N. J.

Frank E. Mathewson, head of the industrial education department of the William L. Dickinson Technical High School, Jersey City, N. J., appointed in January, 1912.

Dr. Ernest B. Kent, director of industrial education in the public schools of Jersey City, N. J., appointed in September, 1907.

Michael W. Murray, director of industrial education in the public schools of Newtonville, Mass., appointed in September, 1908. On February 1, 1909, he started the second public vocational school in the United States. For one year, 1911–12, he served as special agent for part-time schools, State Department of Education, Boston, Mass.

There were probably three or four others, but I cannot now be certain of their identity. I was invited as one of the editors of *Vocational Education,* published at that time in Peoria. I have always looked back upon this experience as a rare privilege. For understanding of the practical details of organizing and directing programs of vocational education, for experience in drafting legislation to accomplish desired objectives, and for mastery of the intricacies of state politics and the ways of state legislatures, it would have been impossible to duplicate this group of 20 to 25 men at that period. It would have been difficult for at least another ten to 15 years.

*(To be continued)*

**Linotype machine and Linotype practice desks, Tucson Senior High School, Tucson, Ariz.**
**— Submitted by Harry A. Goldstein, instructor of photography**

## *Industrial Arts and Vocational Education*

John J. Metz, *Editor*

### THE NEED FOR EYE CARE

Get acquainted with your students is good advice to every teacher at the beginning of the new school year. Naturally, their health status is part of the information to be gathered about each member of your classes, and above all, do not overlook their eyesight.

Dr. James F. Wahl, president of the American Optometric Association, states that juvenile delinquency can frequently be traced back to poor eyesight. He states that most juvenile delinquents have failed in school because they could not read properly. Two out of five children are handicapped in their schoolwork because they have uncorrected eye troubles.

He also claims that modern optical science has advanced so far that almost every one of these children could have been helped to see adequately for his school tasks.

Unfortunately, many of these youngsters are allowed to go on year after year without any attempt being made to do anything to correct their trouble.

Dr. Wahl also states that present standards and methods of sight testing used in most schools are inadequate to determine what is required to correct some shortcomings in vision. It is necessary for everyone, parents, teachers, school nurses, and doctors, to be on the lookout for indications of vision problems, and have those who are troubled with them turned over to experts for final testing. Prevention of poor eyesight will not only help the students but it may, by proper treatment, destroy the cause for much juvenile delinquency.

### CAUTION — FIRE

Fall is approaching. Many teachers and numerous students will make the most of those beautiful autumn days to spend the week ends in the woods and forests for picnicking, hunting, and fishing.

These beautiful days may be very dry with the result that the grass, foliage, and bushes are ready to burn at the slightest provocation. Campfires, and matches used by the smoker, should be handled with the greatest care. Every year, thousands of valuable trees are sacrificed to the carelessness of human beings who do not know how to use nature as it should be used. The careless people who are the cause of all of this loss, seemingly do not know how valuable a tree really is.

Years ago trees were used for raising fruit, furnishing building material, and for kindling. Science, however, has shown us that a tree besides furnishing these items also gives us paper, plastics, and chemicals of various kinds which can be used in many ways.

Burn trees down and all of the above mentioned forest products are lost, and the land on which the trees grew will have to lie idle a long time before it can again offer man what it did before.

In this way the waste represented by a burnt down forest is just a little less grievous than the loss produced by man's other example of thoughtless, foolish waste when he tries to even up real or fancied wrongs by fighting wars.

Of course, after a forest fire, the dead tree stumps and twisted boughs do not represent the terrific loss portrayed by the dead and twisted bodies of men who have been asked to give up their lives so that others might amass more power and wealth with which to satisfy their greed and misguided ambition.

Forest fires and wars, however, present good examples of man's abysmal foolishness. Nothing is gained by either, and yet we continue year after year, and age after age to indulge in these thoughtless and wasteful acts.

You and I can do but little to reduce the carnage of wars, but we can all help in reducing forest fires. Let's train our students to be extremely careful with fire. Instill in them the idea that fire prevention is their business, as well as the forest rangers! Teach them to be careful with matches. One careless act — one lapse of memory — can start a fire and burn a forest.

Each year forest fires, most of them man-caused, destroy enough wood to build eighty-six thousand homes.

A million matches can be made out of a single tree, but it takes but one match, in careless hands, to burn down a forest of a million trees.

Saving the trees, however, is but one factor to emphasize when considering the subject of fire prevention. Far more important is the fact that forest fires also endanger homes and communities, and that in the past some communities have been practically wiped out by forest fires. Then, too, usually a number of men, women, and children lose their lives in these huge conflagrations, to say nothing of the huge loss that they cause among the wild and domestic birds, fowls, and animals, that fall victims to the flames.

To these exhortations about fire hazards when on trips through the fields and forests, it is quite easy to add comments on fire protection in the home, the school, the classrooms, shops, and public buildings. Protecting, or helping to protect against fires is everyone's duty. Your community may have a fine fire department, but the fire fighters alone can accomplish but little. Do everything in your power to help them overcome that dangerous enemy — fire on a rampage!

### HELPING THE STUDENT ACQUIRE PROPER LIFE HABITS

What are you doing about preparing your students for life adjustment? Is it enough to give them a broad insight of what men do to earn a living? Is it sufficient to teach them to apply arithmetical and mathematical formulas to the special problems that arise in doing the shopwork in the various practical subjects classes? Is it sufficient to teach the young all about the many materials used in industry?

Most industrial-arts teachers will at once answer *No* to the questions posed in the foregoing, but when asking those same teachers what they do to make their students ready to co-operate with others, their answers are not very convincing.

And if you analyze the actions of the teachers in connection with their students, or in their contacts with their fellow teachers, the school authorities, and the general public, they give startling examples of the fact that they themselves do not really know what co-operation means.

Can we bring more unanimity between what we teach and what we do? The teacher must be a real leader. Most of them know the value of a good demonstration in teaching their shop subjects. Why not apply the demonstration idea in teaching the boy how to act properly in his association with others?

# Industrial Arts for the Liberal Arts Student

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The advent of industrial arts in the liberal arts colleges is both logical and timely.[1] Our evolving democratic society has placed emphasis on ideals and practices that are in a fluid condition. Among these ideals are the so-called freedoms, in two of which all education is interested — speech and thought. If man is to be free to think and speak rationally, he must be free to act toward this attainment. He must practice living democratically to live democratically. Educationally, man has reached the point of realizing that to acquire our spiraling democratic ends of considering the individual as an end, respecting his obligation to contribute, having faith in his intelligence, giving him the responsibility of sharing decisions that affect him, and continually reconstructing the values of his social order, we must practice democratic policies in our classes. To do these things necessitates an evolving program and facilities as means to our democratic ends. This program conceived in part cannot overlook the fact that we are living in an industrial society. Mass production, giant industrial enterprises, and the conflicting forces of organized labor and management have outmoded laissez-faire education as well as laissez-faire economics.

To transmit our desired culture, we must re-examine our present educational policies in the light of our democratic concepts. Can we learn the worth of the individual in an industrial society by not participating in that society, and while not participating, conscientiously restudy its place in our life gestalt? Can we learn to contribute to our industrial society by not conceiving it in its total context? Can we have faith in the workers' intelligence without experiencing the workers' concepts? Can we reconstruct our society in an intellectual vacuum or share in our industrial culture decisions when we exist in another culture? There can be but one answer, and we have but one alternative. Our schools have one foremost responsibility: a study of industry and industrial concepts as a part of general education — general industry in an industrial society for all students.

### Our Industrial Culture

As is general humanities, general social sciences, general mathematics and science, so is general industry. We have developed an industrial heritage. Specialization in areas of knowledge related to industry have reached a point that necessitates education in liberalism. (Universities and colleges offering courses which indicate this, include: agriculture, commerce and business administration, education, engineering, fine and applied arts, journalism, labor and industrial relations, and liberal arts and sciences.)[2] Selection of information has reached a point that above the substance of industry must be chosen its methods, characteristic achievements, and its limitations. Our industrial culture will mean effective thinking, communication of thought, relevant judgments, and a discrimination of values which have to do with our industrial society. Confidence in this, a measure of belief of our capabilities, will preserve a quality of open-mindedness necessary for balanced ideals of free inquiry in our impending industrial culture.

From the viewpoint of general education, the principal criticism to be leveled at much of present college instruction in industrial subjects is that it consists of courses in special fields, directed toward training the future specialist and making a few concessions to the general students. Most of the time in such courses is devoted to developing a technical vocabulary and technical skills and to systematic presentations of the accumulated fact and theory which has been inherited from the past. Comparatively little serious attention is given to the examination of basic concepts, the nature of industrial enterprise, its great accomplishments or its interrelationships with other areas of interest and activity. What such courses frequently supply are only the bricks of the industrial structure. The student who goes on into more advanced work can build something from them. The general student is more likely to be left simply with bricks. Eventually he constructs his educational edifice elsewhere with other materials.

It frequently happens that even the student who concentrates on a subject field is preoccupied with his specialty to such a degree that he fails to achieve a view of industry as a whole and of the interrelationships of the special fields within it. A general education in industry needs to be provided for the future teacher, engineer, industrial manager or technician, as well as for the general student. One could scarcely insist that all students of history or literature should learn some industrial engineering, for example, but that the industrial manager or technician need not do so.

### Introductory Industrial Courses

It is necessary, therefore, to provide industrial courses at the introductory level which have general rather than special education as their primary aim. Such courses should represent reasonably broad

[1] Research in the status and problems involved in developing a program was announced in the October, 1949, issue of *The Industrial Arts Teacher*.

[2] Paraphrased in part from *General Education in a Free Society*. Report of the Harvard Committee, Harvard Press, Cambridge, 1945. Pp. 220 to 229.

synthesis within the areas of industry and industrial drawing. They should be taught so as to convey some integrative viewpoint, industrial method, or the development of industrial concepts, or the industrial world view. They should convey verbally, and through the shop, some understanding of the various means by which industry progresses: increase in the precision of skills, measurement and drawing, the evolution of fundamental concepts, the introduction of new instruments and procedures, the fructification of one industry by another, the progression from description to production and from qualitative to the quantitative.

The creation of introductory courses in industry, however, does not exhaust the contribution which industrial courses should make to general education or our concern with the general education of the industrial worker. The body of industrial subjects includes not only special knowledge and skills but conceptual interrelationships, a world view, and a view of the nature of man and knowledge, which together constitute the philosophy of industry; a history which forms a continuous and important segment of later human history and presentations which include some of the most significant and impressive contributions to all time. The atomic bomb had been developed in its scientific concept by all nations for some time. American industry changed this concept to reality.

### History of Industry

These aspects of industry are frequently almost entirely neglected in the college teaching of industrial courses. It sometimes happens that members of economic departments devote some attention to the economics of industry. Unfortunately, the professional economist may possess only a remote appreciation of the nature of industry. In any case his contribution usually does not reach either industrial students or members of staffs teaching industrial subjects. *It is an economics of industry for the students of economics.* Similarly, the history of industry may be dealt with in separate courses or in a separate department of the college. Such devices valuable as they may be intrinsically, merely emphasize the avoidance of instruction in the history and economics of industry by authorities on the aspects of industry, themselves.

The claim of general education is that history of industry is part of the study of industry; so are economics, art, and all of its social and intellectual content. The contributions of instruction in industry to the life of the university and to society should include these elements, since industry included them. An industrial course so constructed as to encompass these elements makes an important contribution to general education. It need not by that token make a poorer contribution to an education in industry. One can defend the view that is all the better industrial course for being good general education.

The proposed course concerning general education in industrial subjects must be designed to meet the needs of students who vary widely in aptitude and training. The teaching techniques and methods employed in the existing industrial-arts program lend themselves well to this goal.

To provide for introductory general education in the industries, it is proposed that two new courses be instituted: one in the principles of industry of raw materials and one in the principles of industry of fabricated materials. Both courses are planned primarily to give students an insight into the fundamental principles of the subject and the nature of the industrial enterprise. In neither of them is a systematic factual survey contemplated. Both courses communicate by discussion and example the methods by which industrial knowledge has advanced within the past three hundred years, and illustrate the combination of logical analysis, careful construction and skill, and imaginative insight which has characterized the great industrial advances of the past.

In the industry of raw materials the aspects of manufacturing from raw materials is handled. The history of industry, industrial organization, and management lend themselves well to laboratory work in a study of raw materials, tools, machines, and basic conceptions of the language of industry.

The industry of fabricated materials is concerned with economic and sociological factors, labor relations, and industrial engineering. The shop or laboratory work is concerned with fabricated materials and industrial processes, fundamental skills and appreciations of industrial design.

Both courses include lectures, demonstrations, seminar groups, conferences, and shopwork by individual students.

Though each of these courses could profit intellectually from the advice of scientists, engineers, and other interested scholars, and each might be enlivened with occasional guest lectures, each of them should represent primarily a synthesis in the mind of a single person who is entrusted with the design and direction of the course as a whole.

The way in which topics are presented is itself of great importance. Too often, even in introductory courses, problems appear simply in the form of educational bric-a-brac, hurdles in performances for the student.

In such courses as we have in mind, every effort should be made to have the student understand and assent to the problems which confront him as genuine industrial problems. To a degree this result can be achieved by thorough presentation and discussion, clarified by demonstrations and work in the shop. One prime difficulty however, is that much of the material to be considered does not in fact present problems to the contemporary industrialists; even the not-well-informed student already knows the procedures. Such situations can frequently borrow a very stimulating interest and heightened value by being presented in their proper historical context. Many topics which might now represent only industrial detritus, dull and dry facts, forgotten skills, and processes to be learned by the student, were matters of absorbing concern and controversy in the past. Their educational value and intellectual quality are bound up intimately with their past status. The historical development of the subjects considered in our courses, therefore, should occupy an important place in their design.

General industry in an industrial society will be composed of two semesters overview of the industrial aspects found in our college and university courses. The first semester's work, as previously outlined, based on industrial organization, tools and machines, is to be developed with a historical procedure. These courses are not courses about industry as they will contain much solid industrial know-how. The shopwork in the first semester's course includes identification and study of materials, tools, machines, and work in basic industrial drawing as the language of industry. All this helps to form principles and concepts about our industrial society from another angle.

The second course is built on the first and revolves around our industrial economic and sociological factors, labor relation, and an appreciation of design in industry. The shopwork is centered around industrial processes and skills.

Both courses use much illustrative material, slides, motion pictures, and demonstrations; the first group uses lecturing while the second is based on seminar methods. While the first course handles materials, tools, and machines in the school toward identification, the second course uses them toward skills. Field trips, cooperative planning, and group projects make the second semester collective while the first is individualistic in its laboratory techniques.[3]

The laboratory cannot be limited in the industries which it presents. Materials, raw and fabricated, must be abundantly displayed and used. Yet it must be adaptable to individual and group instruction. For this technique the use of many individual instruction sheets and industrial charts and teaching aids should be used. A large responsibility of the intensity of the course rests with the student. The scope will vary with instructors who determine it. The achievement of educational aims of the individual student is based on conferences and small group seminars. Individual instruction and guidance in laboratory activities tapering toward self-instruction with the provided teaching aids is an important criteria of the shopwork.

In the vernacular, this is a college level general shop course with less emphasis on instructor's time in teaching laboratory skills and more upon covering the larger scope of industry as a whole. It is a synthesis of materials found in colleges of art and reaching to vocations — industrial design to an understanding of the skill needed in operating machines. It is general education.

[3] *Ibid.*

# Basic Glossary in Electricity

**ERNST H. SUERKEN**
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AGONIC: An imaginary line of the earth's surface passing through points where the magnetic declination is 0 degrees, that is, points where the compass points true north.

ALTERNATOR: An alternating current generator.

AMMETER: The instrument for the measurement of electric current.

AMPERE: The unit of electrical current.

AMPERE-HOUR: The quantity of electricity equivalent to a current of one ampere flowing past a point in a conductor for one hour.

AMPERE TURN: The magnetizing force produced by a current of one ampere flowing through a coil of one turn.

ANODE: The electrode in a cell (voltaic or electrolytic) that attracts the negative ions and repels the positive; the positive pole.

ARC: The luminous glow between incandescent electrodes.

ARMATURE: The movable part of a motor or the removable part of a magnetic circuit, such as the iron placed across the poles of a horseshoe magnet.

AUTOTRANSFORMER: A transformer in which the primary and secondary are connected together in one winding.

BATTERY: A group of several cells connected together as a unit.

BRANCH CIRCUIT: One of the conductors in a parallel circuit.

BRUSH: The conducting material, usually a block of carbon, bearing against the commutator or slip rings through which the current flows in or out.

CATHODE: The electrode in a cell (voltaic or primary) that attracts the positive ions and repels the negative ions; the negative pole.

CHOKE COIL: A coil of low ohmic resistance and comparatively high impedance to alternating current.

CIRCUIT: The complete path of an electric current, including usually the generating device.

CIRCUIT BREAKER: A device that opens a circuit while it is carrying current; often used in abnormal conditions, such as overloads.

CIRCULAR MIL: An area equal to that of a circle with a diameter of 0.001 inch. It is used for measuring the cross section of wires.

COMMUTATOR: That part of the armature of a dynamo which converts an alternating into a direct current.

CONDENSER: A device consisting of two or more conductors separated by a nonconductor material; it holds or stores an electric charge.

CONDUCTIVITY: The ease with which a substance transmits electricity.

CONDUCTOR: A material capable of transmitting electric current.

CONVERTER, ROTARY: An electrical machine having a commutator at one end and slip rings at the other end of the armature. It is used for the conversion of alternating to direct current.

CORE: A mass of iron placed inside a coil to increase the magnetism.

COULOMB: The unit of static electricity; the quantity of electricity transferred by one ampere in one second.

COUNTER EMF: Counter electromotive force; an EMF introduced in a coil or armature that opposes the applied voltage.

CURRENT OF ELECTRICITY: The continuous flow of electrons in a circuit.

D'ARSONVAL GALVANOMETER: A gal-

vanometer in which a moving coil swings between the poles of a permanent horseshoe magnet.

DEMAGNETIZE: To deprive a body of its magnetic properties.

DIELECTRIC: A nonconducting material.

DIODE: A vacuum tube containing the filament and the plate; it serves as a rectifier of alternating current.

DIP NEEDLE: A magnetized needle capable of rotation in a vertical plane.

DIRECT CURRENT: An electric current that flows in one direction only.

DYNAMO: A machine for converting mechanical energy into electrical energy or vice versa.

EDDY CURRENT: A current induced in the core of an armature of a motor, dynamo, or transformer, caused by changes in the magnetic field.

EFFICIENCY: The ratio of a machine's useful work output to the total input.

ELECTRODE: The terminal by which current leaves or enters an electrolytic cell.

ELECTROLYTE: A substance that conducts a current by the movement of ions.

ELECTROMAGNET: A magnet made by passing current through a coil of wire wound on a soft iron core.

ELECTROMOTIVE FORCE (EMF): The electrical force that moves or tends to move electrons.

ELECTRON: The one smallest particle of negative electricity.

ELECTROPLATING: The electrical method of plating a surface with a metal.

ENERGY: The ability or capacity to do work.

FIELD: The region where a magnet or electrical charge is capable of exerting its force.

FIELD COIL: One of the coils used to excite a field magnet.

FIELD MAGNET: The magnet used to produce a magnetic field (usually in motors or generators).

FLUX: Magnetic lines of force, assumed to flow from the north pole to the south pole of a magnet.

FREQUENCY: The number of cycles of an alternating current per second.

FUSE: A part of a circuit made of a material that will melt and break the circuit when current is increased beyond a specific value.

GALVANOMETER: An instrument used to measure small currents.

GENERATOR: A machine that converts mechanical energy into electrical energy.

GRID: A metal wire mesh placed between the cathode and plate.

GRID BATTERY: The battery used to supply the desired potential to the grid.

GRID LEAK: A very high resistance placed in parallel with the grid condenser.

GROUND: A connection made directly to the earth or to a frame or structure which then serves as one line of a circuit.

HORSEPOWER: The English unit of power, equal to work done at the rate of 550 foot-pounds per second. Equal to 746 watts of electrical power.

INDUCE: To produce an effect in a body by exposing it to the influence of a magnetic force, an electric force, or a changing current.

INDUCTION COIL: Two coils so arranged that an interrupted current in the first produces a voltage in the second.

INTERRUPTER: A device for the automatic making and breaking of an electrical circuit.

ION: An electrically charged atom.

ISOGONIC LINE: An imaginary line drawn through points on the earth's surface where the magnetic deviation is equal.

JOULE: A unit of energy or work. A joule of energy is liberated by one ampere flowing for one second through a resistance of one ohm.

LAG: The number of degrees an alternating current lags behind voltage.

LAMINATIONS: The thin sheets or disks making up an iron core.

LEYDEN JAR: An early form of condenser.

LINE OF FORCE: A line in a field of force that shows the direction of the force.

LOAD: The energy delivered by a generator to its circuit.

LOADSTONE: A piece of magnetite.

MAGNETIC CIRCUIT: The complete path followed by magnetic lines of force.

MAGNETIC FLUX: The total number of lines of force issuing from a pole.

MAGNETITE: An iron ore that is magnetic.

MAGNETO: A generator in which the field is supplied by a permanent magnet.

MEGOHM: A million ohms.

MIL: One thousandth of an inch.

MILLIAMMETER: An ammeter reading to thousandths of an ampere.

MILLIVOLTMETER: A voltmeter reading to thousandths of a volt.

MOTOR GENERATOR (MG): A generator driven by an electric motor.

MUTUAL INDUCTION: The inducing of an EMF in a circuit by the field of a nearby circuit.

NEGATIVE CHARGE: The electrical charge carried by a body which has an excess of electrons. (For example, a vulcanic rod, after it has been rubbed by fur or wool, carries a negative charge.)

NEUTRON: A particle having the weight of a proton but carrying no electric charge.

NUCLEUS: The heavy or central part of an atom.

OHMMETER: An instrument for directly measuring ohms.

PERMALLOY: An alloy containing 78.5 per cent nickel and 21.5 per cent iron. It has an abnormally high magnetic permeability.

PERMEABILITY: A property of matter that indicates the ease with which it is magnetized.

PLATE CURRENT: The current that flows from the plate of a vacuum tube.

POLARITY: The characteristic of having magnetic poles, or electric charges.

POLE: One of the ends of a magnet where most of its magnetism is concentrated.

POSITIVE CHARGE: The electrical charge carried by a body which has become deficient in electrons. (For example, a glass rod, after it has been rubbed by silk, carries a positive charge.)

POTENTIAL: The amount of charge held by a body.

POWER: The time rate of doing work.

PROTON: A positively charged particle whose charge is equal, but opposite to that of the electron.

RECTIFY: To change an alternating current to a unidirectional or direct current.

RELAY: An electrically operated device for the closing and opening of a circuit.

RELUCTANCE: A measure of the resistance of a material to magnetic lines of force.

RESISTANCE: The opposition of a conductor to an electric current.

RETENTIVITY: The property of retaining magnetism.

SATURATION, MAGNETIC: The condition of a magnetic substance when the magnetism has reached its highest possible value.

SELF-INDUCTION: The process by which a circuit induces an EMF in itself by its own magnetic field.

SERIES CONNECTION: An arrangement

of cells, generators, condensers, or conductors, so that each carries the entire current of the circuit.

SERIES-WOUND: Having the armature wired in series with the field winding. (Applied to motors or generators.)

SOLENOID: A coil of wire used to produce a magnetic field.

SPACE CHARGE: The charge acquired by the space inside a vacuum tube due to the presence of electrons.

STEP-DOWN TRANSFORMER: A transformer with fewer turns in the secondary than in the primary.

STEP-UP TRANSFORMER: A transformer with more turns in the secondary than in the primary.

THERMOCOUPLE: A pair of metals which generate an EMF by the heating of one of the junctions; it is used to measure temperature differences.

TRANSFORMER: A device that, without moving parts, transfers electrical energy from one circuit to another circuit by the aid of electromagnetic induction.

TRIODE: A vacuum tube containing a filament, grid, and plate.

UNIDIRECTIONAL: As applied to a current of electricity, a current that flows in one direction only.

VACUUM TUBE: A tube from which the air has been pumped out. The tube contains an element that emits electrons when properly excited and an electrode to attract the electrons and set up a current in an external circuit.

VOLT: The practical unit of electrical pressure.

WATT: A unit of power produced by a current of one ampere at one volt.

WATTMETER: An instrument for measuring electric power in watts.

# PROBLEMS AND PROJECTS

## ELECTRIC HOT PLATE

**CLIFFORD L. YARD**
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State Teachers College
Millersville, Pa.

This electric hot plate is a good industrial-arts project for several reasons; it is a versatile project involving patternmaking, aluminum casting, and machine-shop work, as well as being a useful project for the home or school shop. It may be used for heating glue, for heating etching or plating solutions, for heating water in which plastics are to be bent or shaped, or for cleaning brushes, etc.

It is an inexpensive project designed to utilize a replacement heating element for a silex coffee maker which is available in most appliance stores.

**BILL OF MATERIALS**

| *No. of pieces* | *Material* | *Size* |
|---|---|---|
| 1 | Maple, or any wood suitable for pattern-making | 6 in. dia. x ¼ in. |
| 1 | Maple | 6 in. dia. x 1⅝ in. |
| 1 | Hard asbestos | 5 in. dia. x ⅛ in. |
| 3 | Machine screws | No. 6-32 x ⅜ in. r.h. |
| 1 | Machine screw | No. 6-32 x 1 in. r.h. |
| 3 lb. | aluminum scrap | |
| 1 | Heating unit — replacement unit for silex coffee maker | |
| 1 | Appliance cord with small plug | |

### Procedure

Making the pattern:

1. Turn the two pieces for the pattern shown at *A* and *E* in Figure 1.
2. Lay out and saw piece *E* Figure 1, to form the three feet and the recess clearance for inserting and removing the heating element, shown at *C* in Figure 1.
3. File and smooth all arrises on the cuts just made.
4. Drill holes for dowels in both pieces of the pattern and glue the dowels in the upper piece.
5. Shellac the pattern.

*Casting*

1. Temper sand.
2. Place cope on molding board and locate the pattern, shown at *C*, in Figure 1.
3. Ram the cope.
4. Invert cope, place drag and second piece of pattern (*A* in Figure 1) in place.
5. Ram the drag.
6. Vent and cut risers.
7. Remove pattern and cut gates.
8. Heat and pour aluminum.
9. Remove fins and clean casting.

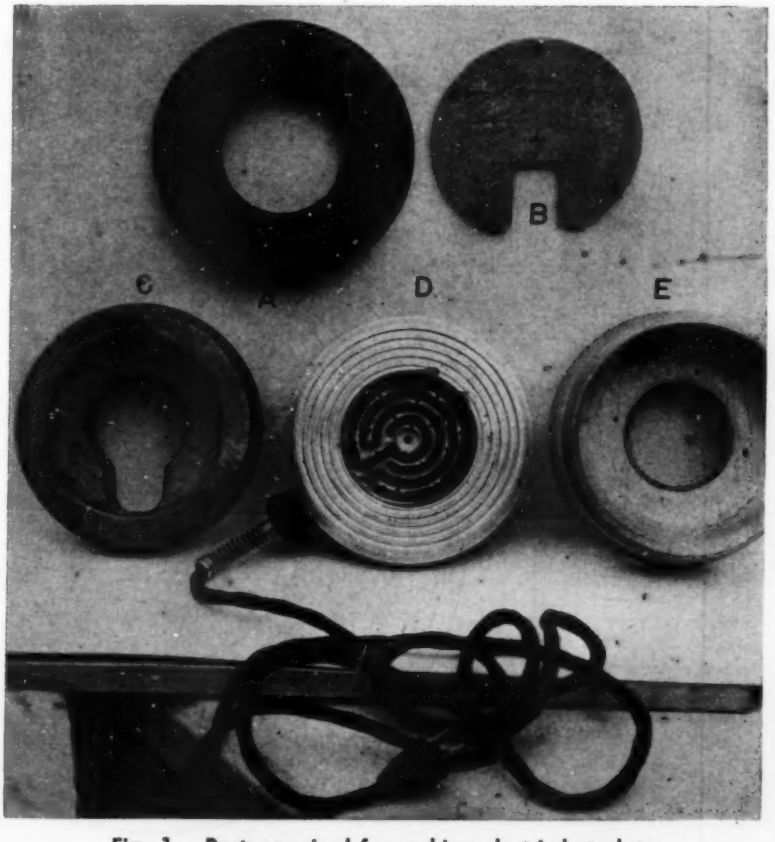



Fig. 1. Parts required for making electric hot plate

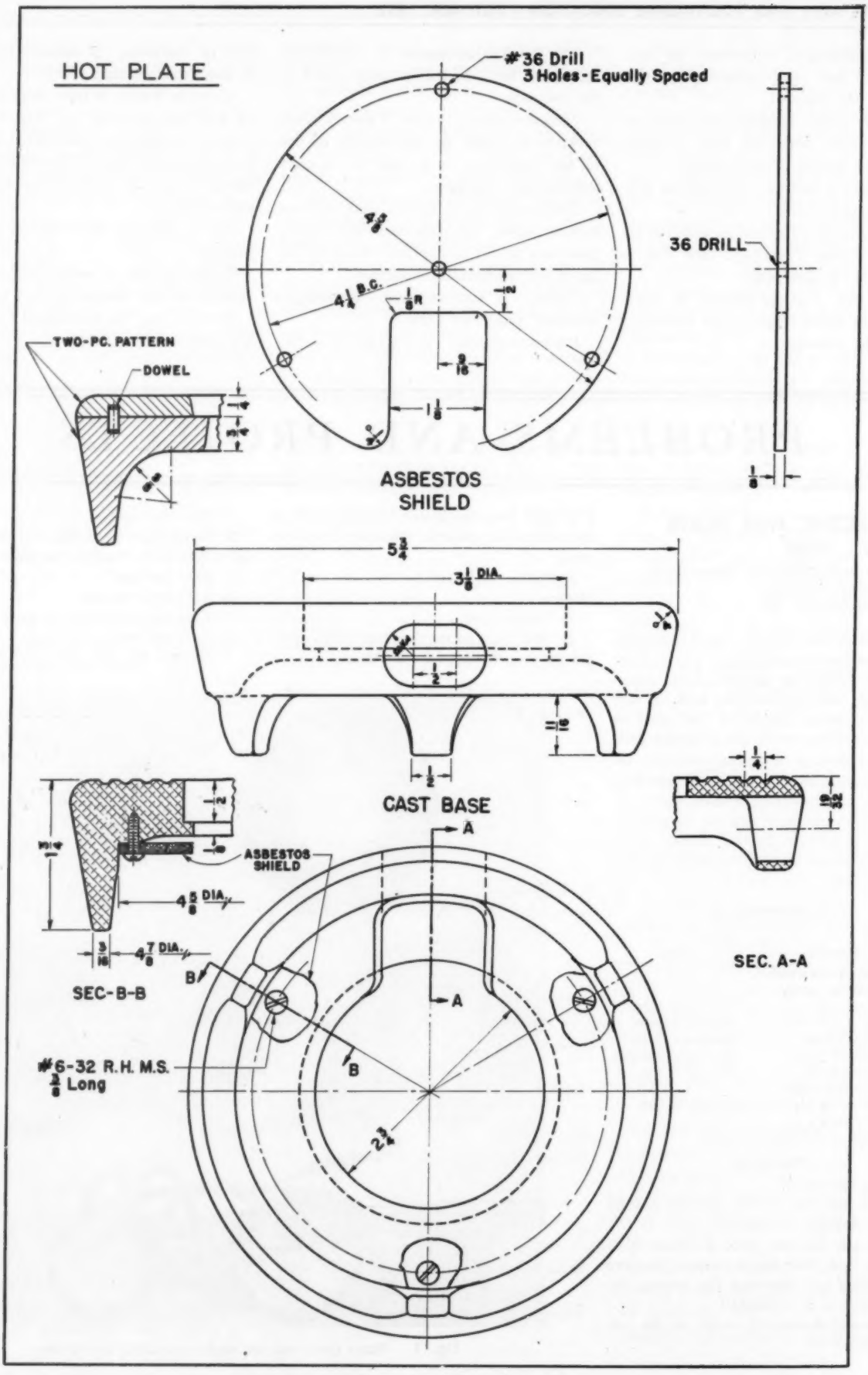



Fig. 2. Details of electric hot plate

*Machining*

1. Chuck in lathe with feet out and turn seat for asbestos shield. See *B* in Figure 1.
2. Bore 2¾-dia. hole.
3. Invert in chuck and turn top true.
4. Turn 3⅛-dia. recess for heating element.
5. Turn concentric grooves in top.

*Finishing*

1. Make asbestos shield. See *B*, Figure 1.
2. Drill and tap base for No. 6–32 machine screws.
3. Fasten asbestos shield to aluminum base.
4. Insert heating element and bolt to asbestos shield.
5. Test for operation.

## STACK-UP BOOK SHELVES

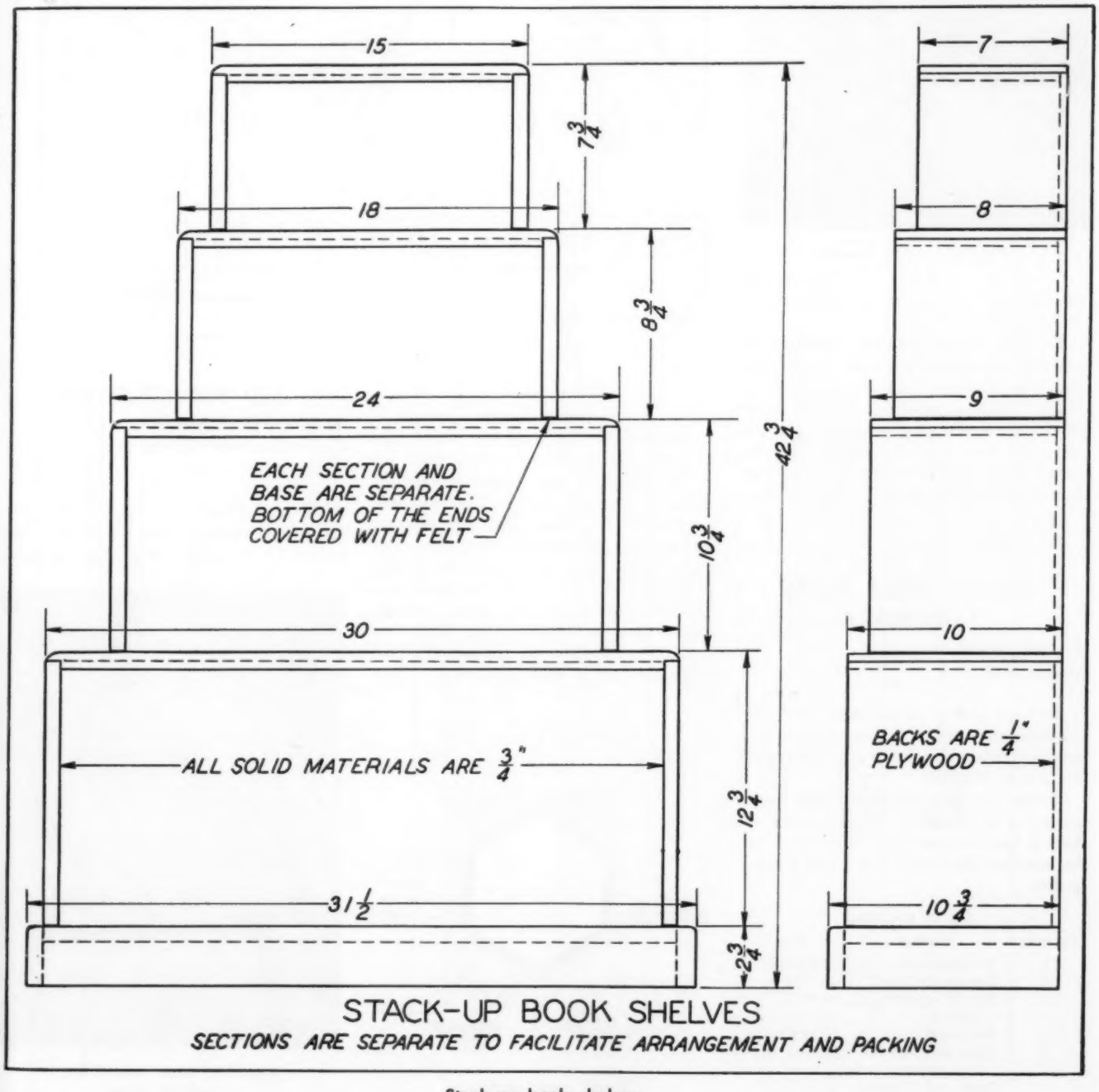
**S. M. DELL**
McPherson College
McPherson, Kans.

The book shelves, illustrated and described herewith, have proved very satisfactory as a project for woodworking students.

The project has considerable appeal where space is at a premium. This is especially true of students living in dormitories or where boys wish to have books in their rooms at home.

Because the shelves are adaptable to many situations and they pack together for storage or moving, they are especially desirable.

The shelves may be constructed of pine or magnolia if expense is an item or if simplicity of construction is necessary. However, walnut or mahogany will add considerable to the ap-




Stack-up bopk shelves

Stack-up book shelves

pearance and will enable the shelves to be used for greater versatility.

The finish applied should be typical for the particular wood used. The usual woodworking tools and machines are the equipment required. The size and design may be varied to suit the needs and circumstances of the user. The base may be omitted; however, most students who are required to clean their own rooms prefer the base.

## HANDY SMALL PARTS CONTAINER

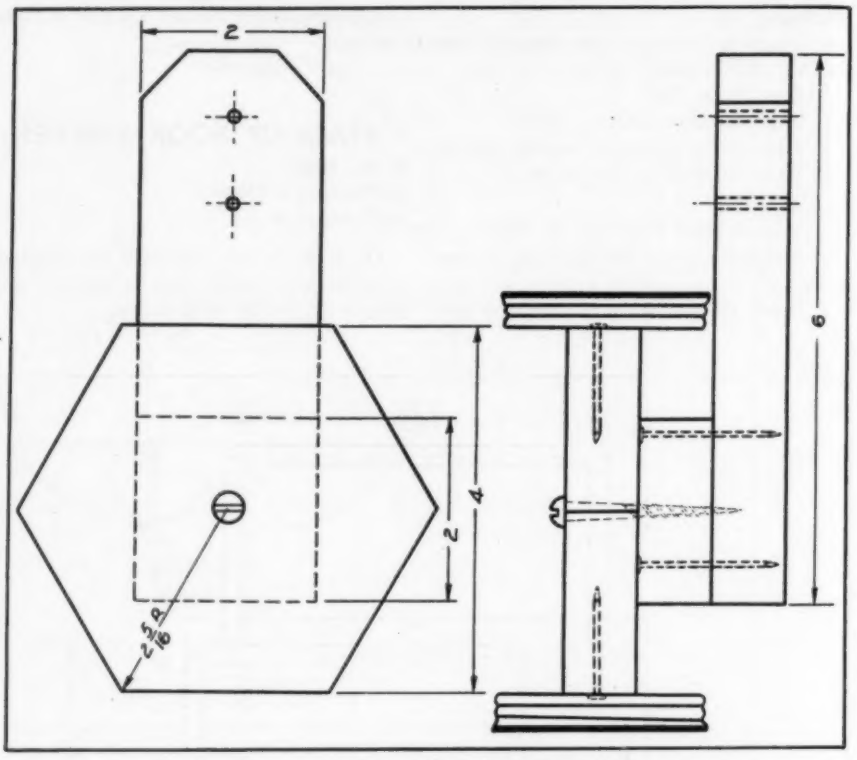
**L. LYLE BAKER**
Dallas, Tex.

Here is a project for the junior high school industrial-arts student. It can be made from scraps of wood and empty glass jars which are always available.

Perhaps the most important reason for the project is its usefulness. This dispenser will keep a host of small items where they may be found quickly; hence, it is a very practical gadget.

**BILL OF MATERIALS**

| *No. of Pcs.* | *Material* | *Size* |
|---|---|---|
| 1 | Soft pine for the hub | 1 x 4 x 5 in. |
| 1 | Pine for the back | 1 x 2 x 6 in. |
| 1 | Pine for mounting the hub | 1 x 2 x 2 |
| 1 | R.h. screw | No. 8 x 1½ in. |
| 6 | Glass jars and lids (mustard jars — 4 oz. approximately) | |
| | Paint and *3d.* nails. | |




Handy merry-go-round small parts container

### Procedure

Lay out the hub. Construct a regular inscribed hexagon 4 in. across the flats — radius of circle 2 5/16 in. Bore a 3/16-in. center hole in hub. Chamfer top corners of the 6-in. back piece and nail the 2 by 2-in. block onto the bottom of it. Bore anchor hole in center of block and two holes for No. 6 screws near top of back piece for hanging the finished product on the wall. Paint the parts, then nail caps around the hub, using a circular wooden block on bench as a jig. Attach hub to back block, screw on jars and the small parts container is ready for use.

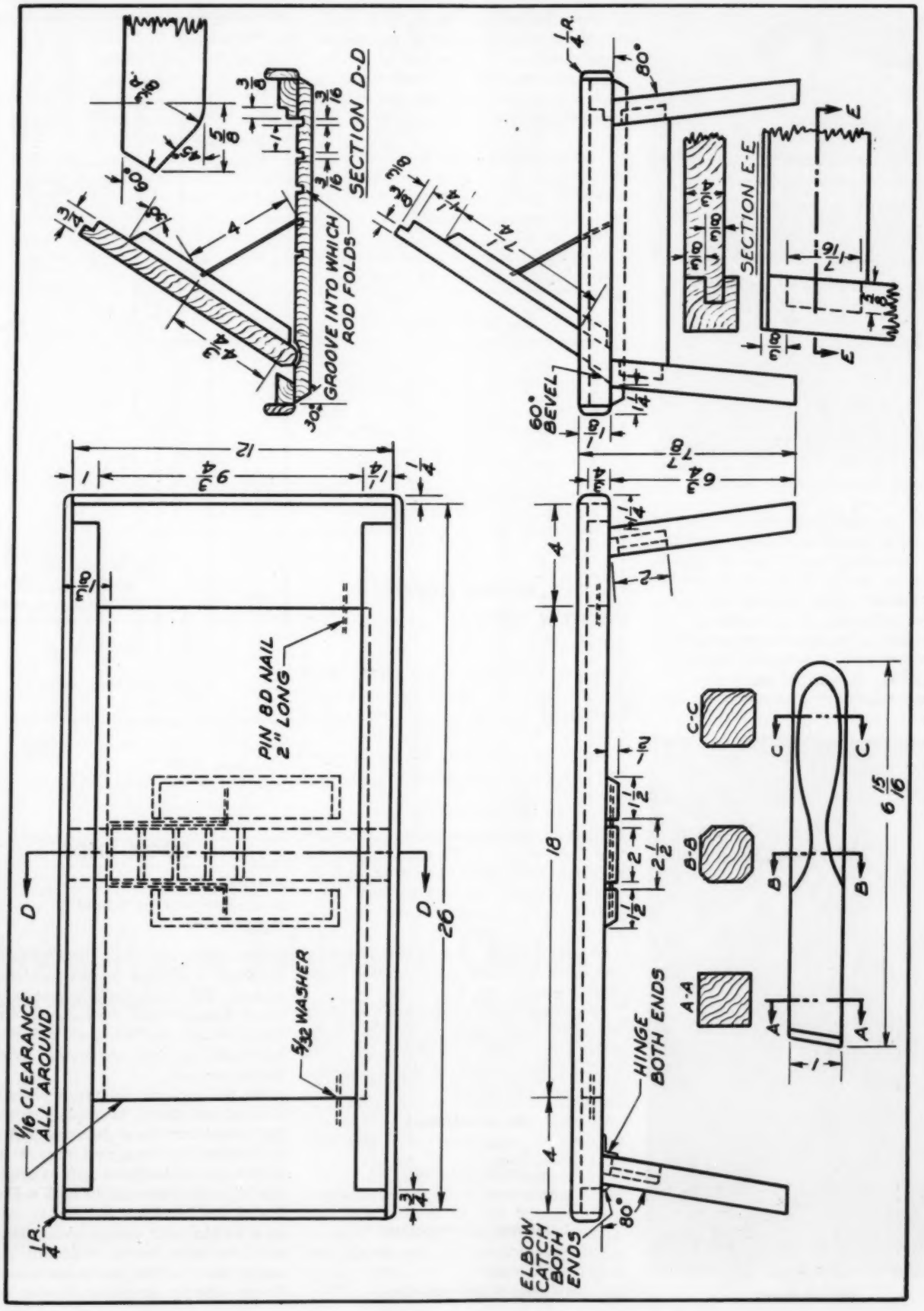
Small parts container

## BED SERVICE TABLE

**J. HOWARD WADDELL**
Calvin Coolidge High School
Washington, D. C.

The varied and basic construction operations of this project make it a suitable class project for the student with some experience

Fig. 1. Easel raised for reading table




Bed service table

Fig. 2. Easel down for writing, serving, or play table

in woodshop. The folding up action stimulates additional interest and its sturdiness and versatility make it very practical.

A bed service table will prove to be a useful article in any home. There is an easel in the top of this one which is adjustable to the desired angle for making it a reading table. With the easel down, it becomes a writing table, a tray for serving food or a play table for the child convalescing. It will be a wonderful convenience for the bedridden person. The legs fold under to make it compact for storing away.

The student should recognize the importance of performing certain operations in a logical order of procedure, which follows:

1. Turn the legs according to plan.
2. Lay out and cut mortises.
3. Make the rails.

Fig. 3. Folding the table for storing away

4. Assemble legs to rails.
5. Make angle cut on top of legs and rail in one operation.
6. Make sides, ends, and easel of top.
7. Fasten easel in place with pins as top is assembled. Be sure to use a washer on each pin.
8. Brass rod prop should be placed in battens as battens are fastened to top with wood screws. Be sure to place battens so rod will be in back groove of stretcher when easel is down.

NOTE: Make a groove in the stretcher to receive bottom edge of easel when easel is raised.

**BILL OF MATERIALS**

| *No. of Pcs.* | *Name of part* | *Size* |
|---|---|---|
| 4 | Legs | 1 x 1 x 8 |
| 2 | Rails | ¾ x 2 x 10½ |
| 2 | Ends of top | ¾ x 4½ x 12 |
| 1 | Side of top | ¾ x 1¼ x 24½ |
| 1 | Side of top | ¾ x 1⅜ x 24½ |
| 1 | Easel | ¾ x 9¾ x 18 |
| 2 | Easel battens | ½ x 1½ x 5½ |
| 1 | Stretcher | ½ x 2 x 12 |
| 2 | Band strips for top | ¼ x 1⅜ x 26½ |
| 2 | Band strips for top | ¼ x 1⅜ x 12 |
| 1 | Brass rod | ⅛ D. x 12½ |

## LACING HOOK

**EVERETT H. WEBSTER**
Buffalo, N. Y.

Drawing laces tight on ice skates, roller skates, or boots can become a problem when handicapped with cold fingers, stiff leather laces, or bulky sport clothing.

The lacing hook shown in Figure 1 has been found to be unusually helpful in overcoming this problem.

Boys at the age level of seventh- and eighth-grade students always enjoy adding to their sports equipment. Therefore this project has proved to be popular as well as practical.

Birch doweling was used for both pieces because of its strength and convenient size and shape.

Several variations of this lacing hook have been made depending upon the boys' individual preference for size or use.

The project can be finished either by painting (school colors appeal to the boys) or by giving it three coats of shellac. If the latter method is used a coat of wax is suggested to complete the project.

**BILL OF MATERIALS**

| *No. of Pcs.* | *Name* | *Size* |
|---|---|---|
| 1 | Cross member | ⅜ x 3½ |
| 1 | Body piece | 9/16 x 5¾ |
| 1 | Cup hook | No. 12 bright wire |

### Method of Procedure

1. Select stock and cut cross member and body piece to length.
2. Bevel ends of both pieces.

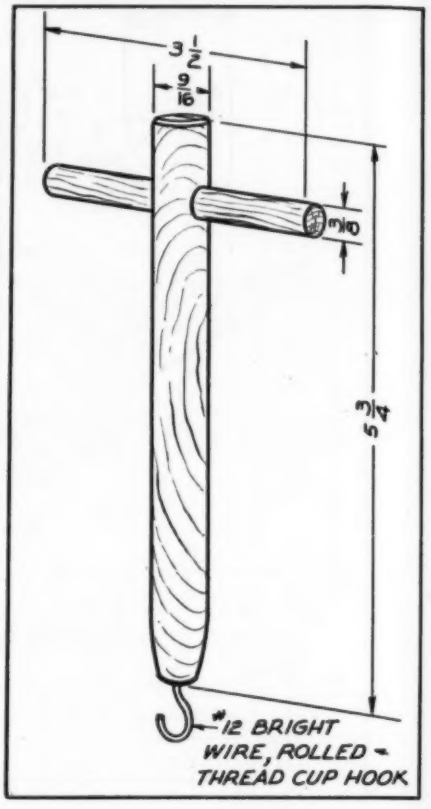



Fig. 1. Lacing hook

3. Lay out and bore body pieces.
4. Glue and assemble.
5. Drill and set hook.
6. Finish sanding the entire project.
7. Apply finish.
8. Wax if desired.

## BOOK ENDS

**WILLARD W. MILLER**
Monroe Union High School
Monroe, Ore.

What to do with small hardwood pieces is frequently a problem for the woodshop instructor. This is particularly true in some school districts where the budget is limited. The book end described herein utilizes small hardwood pieces but it also provides a creative interest as well.

For the best contrast, two or three types of hardwood should be used, preferably a light wood next to a dark wood. A good combination for the upright parts is to use a light colored hardwood such as maple for the tall center pieces and the small end pieces. A dark wood such as black walnut could be used for the other upright pieces. The base could be made from a moderately colored wood. The writer has used a rare local wood, Oregon Myrtle, for bases. However, many

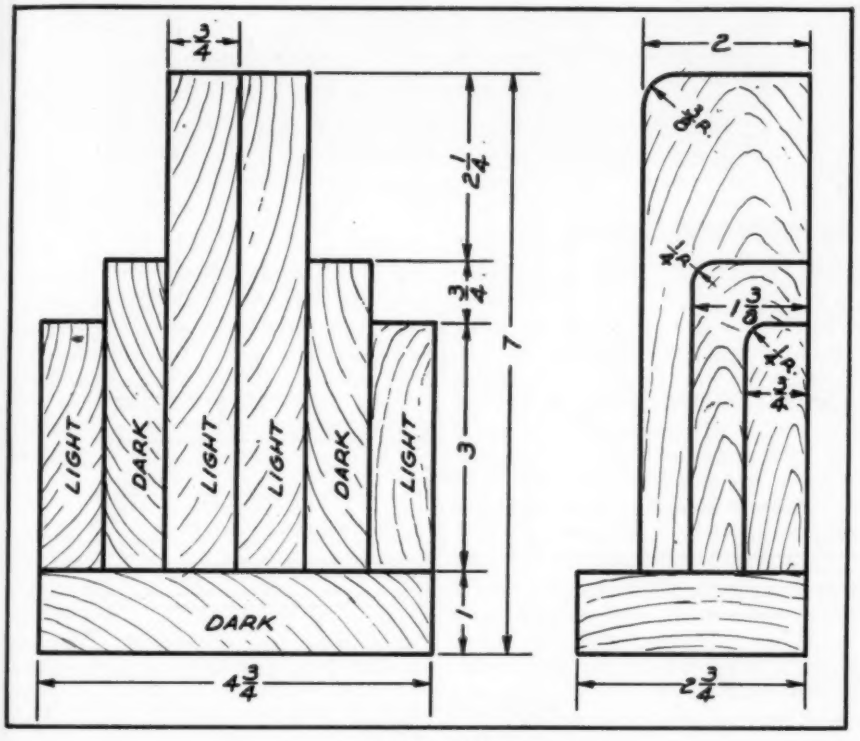
other combinations can be used. The base need not be 1 inch thick as shown, but if small pieces of this thickness are available, it is better because the thicker wood provides more weight.

Each part is first squared up and made to size. The rounds are then formed and all pieces are well sanded being careful not to round edges to be glued. The upright pieces are then glued in one operation, using glue sparingly to avoid excessive exposed glue. When done right there shouldn't be an excess. After the top has been assembled, glued and dried, it should be glued to the base. A disk sander can be used to advantage for the bottom of the assembled upright pieces in making a flush fit to the base for gluing.

For a pair of these book ends you will need the following:

**BILL OF MATERIALS**

| | | *Size* |
|---|---|---|
| 4 | Upright pieces | ¾ x 2 x 6 |
| 4 | Upright pieces | ¾ x 1⅜ x 3¾ |
| 4 | Upright pieces | ¾ x ¾ x 3 |
| 2 | Bases | 1 x 2¾ x 4¾ |




Book ends

Dining chair

construction used in putting the members together. It will be noted that the gate rail *G* is fastened to the stationary rail *F* with an invisible hinge.

The top and drop leaves should be made of well-seasoned wood. It is better to use several narrow pieces of stock glued together in making the top and the drop leaves, rather than wide stock. Wide pieces glued together may warp. Regular table top fasteners may be used to fasten the top down to the rails in place of the wooden cleats shown in the assembly drawing.

All pieces should be sanded separately before assembling. Cleaning and final sanding

# Dining Room Table and Chairs

**PETER G. POLOWNIAK**
Industrial Arts Teacher
Passaic, N. J.

The gate-leg dining table and chairs described in this article, lend themselves easily to the requirements of modern day living. The trend toward eliminating the dining room as a separate room and replacing it with a dining area in a large living room calls for design in dining furniture which will blend with other living room pieces. When not used for dining, the table can be folded and used as an occasional table, while the chairs may be put to use as living room pieces.

These pieces were designed after giving careful consideration to the foregoing and after studying period furniture. The size and construction is in accordance with the accepted practices of quality furniture making. The simplicity of design and construction places this project within the realm of a high school boy's ability.

### Gate-Leg Table

The details of the table in Figure 1 show the individual members cut to size. In constructing the table, it might be well to make the legs and rails first, and assemble these before making the top and the drop leaves.

The assembly drawing (Fig. 1) shows the

Armchair

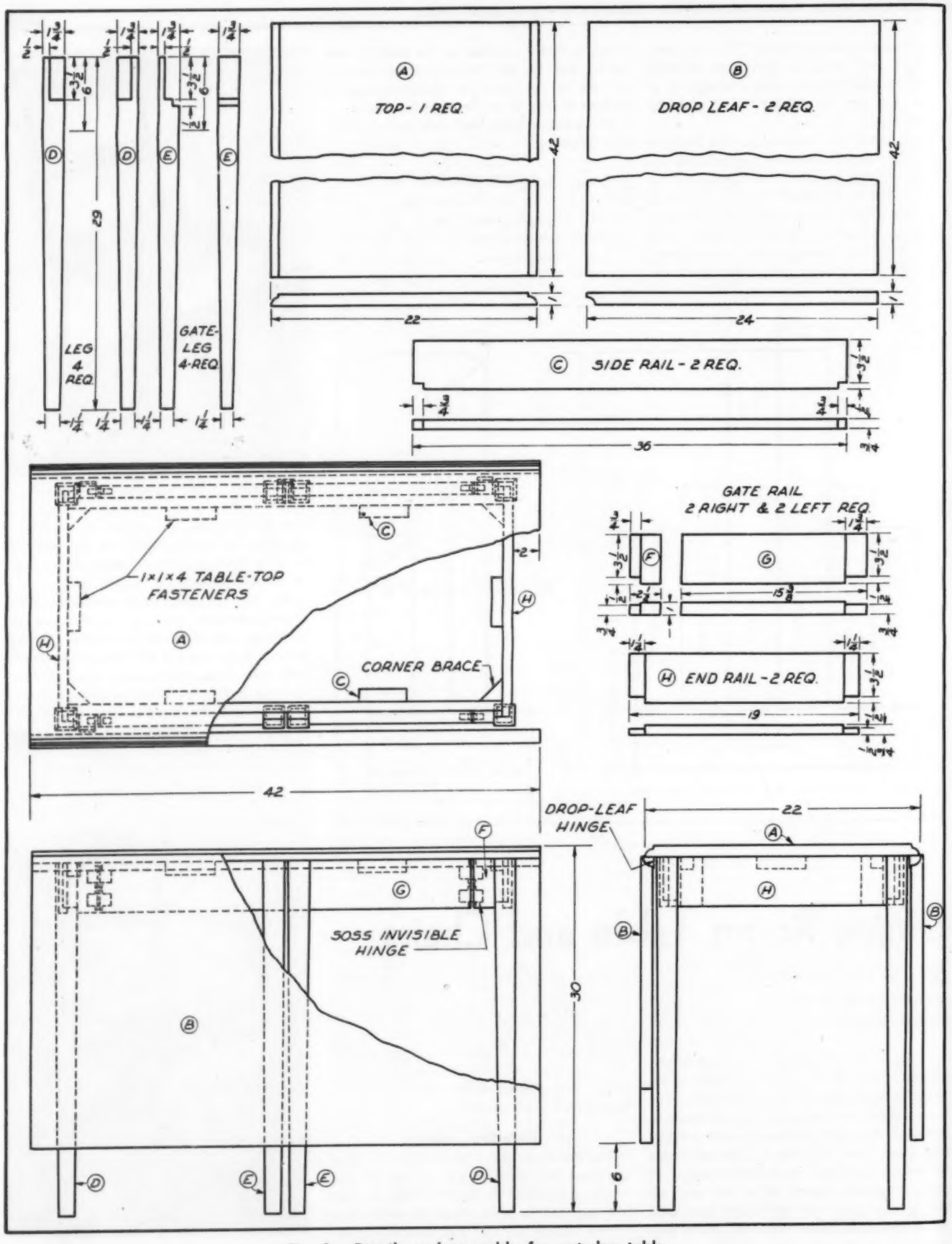
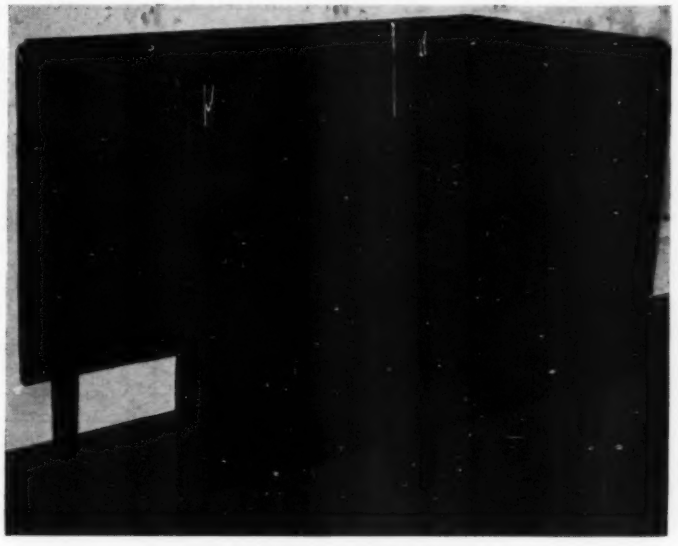



Fig. 1. Details and assembly for gate-leg table



Dining room table

should be done before the application of any finishing material. It is advisable to finish the top and drop leaves separately. After the final coat of finishing material has been rubbed down, fasten the drop leaves to the top with drop leave hinges. Next fasten the attached top and drop leaves to the assembled legs and rails. Then polish as desired.

### Dining Room Chair

Figure 2 shows the sizes and shapes of the individual members used for making the dining room chairs. Use straight grained, well-seasoned wood. Lay the pattern, for the back legs *B*, on the wood in such a manner as to take full advantage of the strength inherent in the longer grain of the wood. Dowel construction may be used in place of mortise-and-tenon joints.

The shoulder rest *D* was made of two pieces. A piece, 3½ by 4½ by 18 in., was cut on a band saw and shaped as illustrated in section *E-E*. The half round bead was made out of a separate piece ¾ by 1½ by 18 in. It was shaped, bent, and glued to piece *D*. Steaming it helps prevent splitting when bending. A jig aids in clamping both pieces together. If care is exercised in shaping and sanding, the joint will be difficult to detect.

The back rest *E* is cut out of a solid piece 2 by 3 by 14 in., and shaped with a spokeshave in the same manner as the shoulder rest *D*.

The front leg *A*, the rail *C*, and the back leg *B*, are cut and shaped leaving the edges square to the sides. Next the three pieces are glued together and then the edges are shaped either on a shaper or filed according to the respective sections *A-A*, *B-B*, etc. It is better to do this operation when the three pieces are assembled rather than as separate pieces.

Next the top of legs *D* is shaped to fit the curve of the shoulder rest. It may be necessary to cut and shape both the top of the legs and the shoulder rest in order to get a good fit. The shoulder rest is fastened to the top of the back leg with glue and a wood screw. Bore and countersink top of leg for proper size of flat head wood screw. Countersink deep enough to allow for a wood plug which will cover the head of the screw.

Mark and bore holes for ¼-in. dowels which are to hold the back rest in place, in both the legs and the back rest *E*.

Both cross rails *G* and *F* should be cut and holes bored for ⅝-in. dowels. Then mark and bore same size holes in the assembled pieces *A*, *B*, and *C*. When assembled, the dowels pin the tenons in place, adding strength to the joint.

Braces *H* and *I* are cut and fitted. Since the braces are to be glued and screwed to the rails *C*, *G*, and *F*, locate, bore, and countersink for wood screws.

When all holes are bored and countersunk, and dowels cut to fit, assemble chair with screws, using no glue at all. Check, fit, and line up all members to see if chair sets level and true. When all seems satisfactory, take it all apart, except, of course, pieces *A*, *B*, and *C*, which have been glued and remain as sides for the chair.

Use a good waterproof glue and apply to joints where necessary, assemble, screw, and clamp chair together.

When the glue has dried, clean and sandpaper the whole piece in preparation for finishing. Each piece should be well sanded before assembling.

### The Armchair

Figure 3 shows the details and the assembly drawing of the armchair. The pieces for the armchair are cut and shaped in the same way as those of the regular dining chair.

The legs *A* and *B*, the rail *C*, and the arm rest *G* and *F* are cut, shaped, and assembled, leaving the edges square to the sides. The edges are then shaped or filed according to section *A-A*, *B-B*, etc.

The procedure for assembling, from this point on, is the same as that followed in putting together the regular dining room chair.

### Finishing

Furniture of this kind deserves a finish of quality. The following is recommended:

1. Final sanding with 6/0 sandpaper.
2. Sponge lightly to raise grain.
3. Sand lightly with 6/0 sandpaper.
4. Size with a very thin wash coat of glue size. This is done to prevent the stain from penetrating too deeply in spots where the wood is more absorbent. End grain may receive a more liberal application of the size. The glue size also raises the grain and stiffens it for the sandpaper to shear off.
5. When dry, sandpaper again with 6/0.
6. Stain with a good quality water soluble or alcohol soluble aniline stain of the desired color. One or two applications may be necessary to produce the desired shade.
7. Brush or spray on a thin coat of either lacquer or shellac sealer.
8. If lacquer is to be the final material, use a lacquer filler. Otherwise the usual wood-paste filler may be applied. If an open pore finish is preferred, do not use filler.
9. If filler is used, sandpaper lightly with 7/0 sandpaper when dry, and seal with a thin coat of lacquer, shellac, or varnish sealer, whichever the case may require.
10. Next brush or spray on two thin coats of either lacquer, shellac, or varnish, depending on which is desired. Allow sufficient drying time, and sandpaper lightly with 7/0 sandpaper after each of the coats.
11. A third coat of either finish is applied a little heavier than the two preceding coats. It is recommended, that, after allowing the third coat to dry for at least 48 hours, it should be rubbed down with pumice stone and water. Use a felt pad and rub carefully. Water and pumice cuts very rapidly.
12. Wipe and dry thoroughly, cleaning off all traces of water and pumice.
13. Apply a fourth coat of finishing material the same consistency as the third coat. After a drying period of at least 48 hours, rub down with pumice stone and oil, followed, if desired by a light rubbing with rottenstone and oil. It is possible to produce

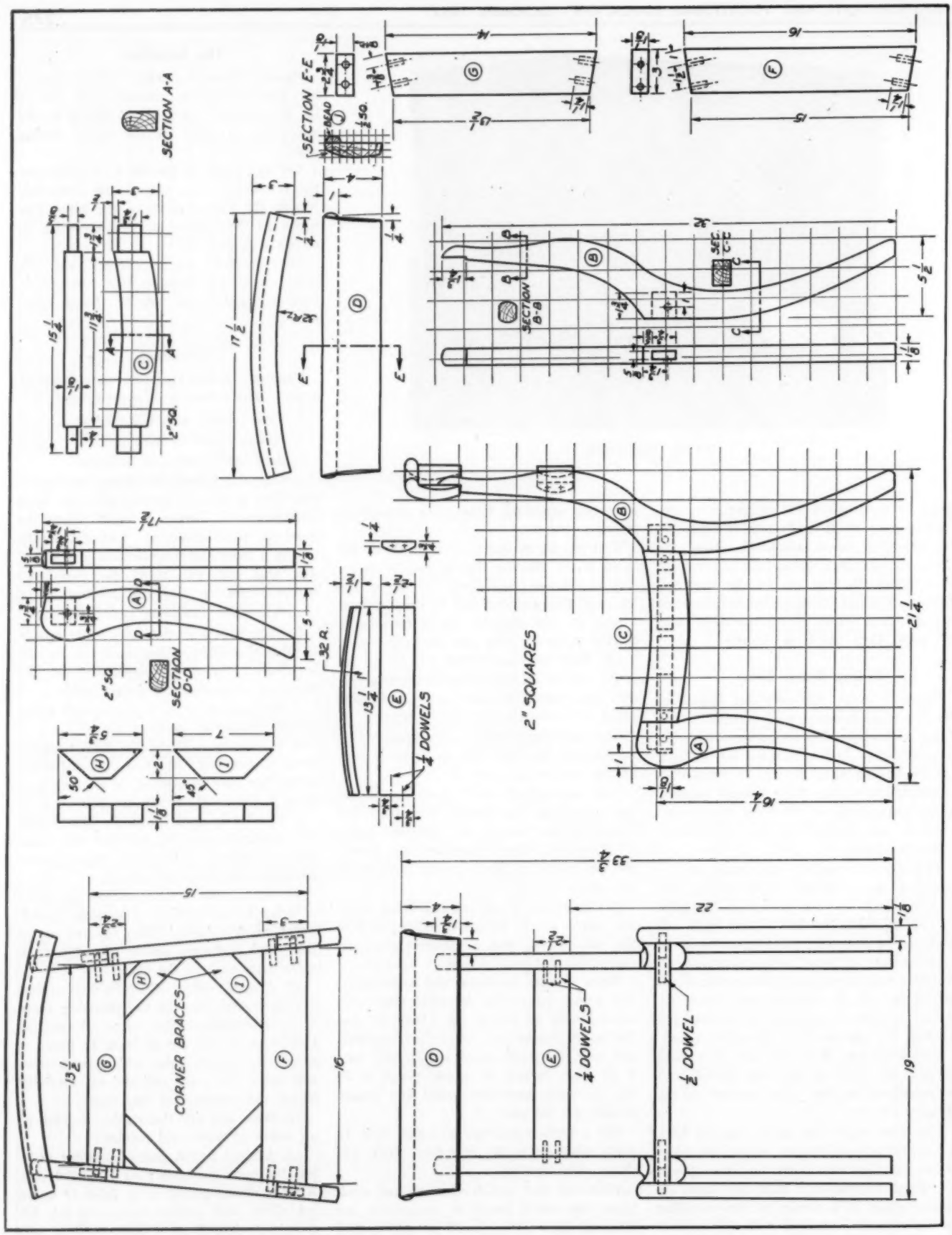



Fig. 2. Details and assembly for dining room chair

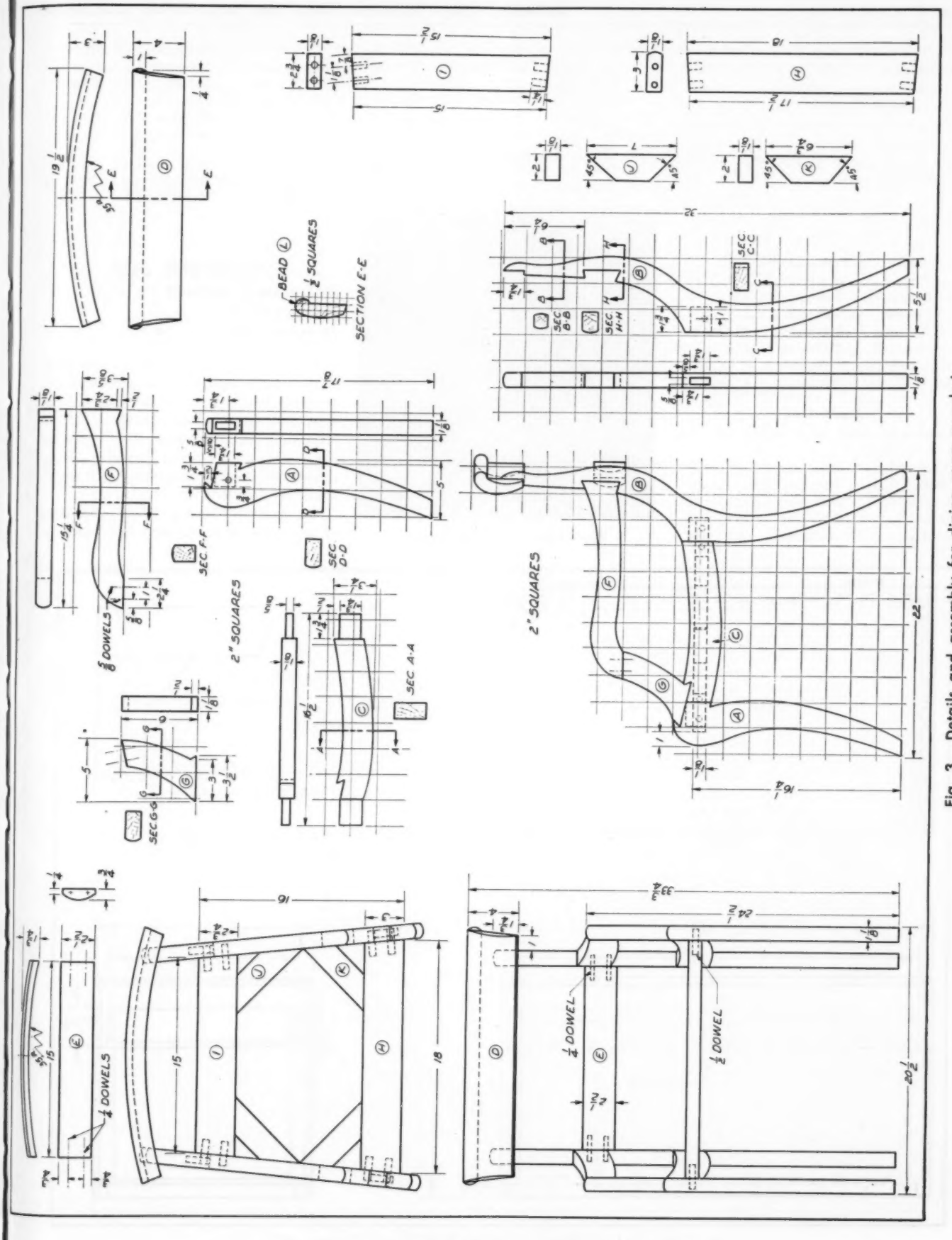



Fig. 2. Details and assembly for dining room chair

Fig. 3. Details and assembly for dining room armchair

a finish that may vary from a dull velvet to a high gloss. If a high polish is not desired, omit rubbing with rottenstone and oil.

All finishing material should be of high quality. The pieces described in this article were finished in lacquer. Make your requirements known to your supplier when purchasing finishing materials.

**BILL OF MATERIALS**

**Table**

| *No. of Pcs.* | *Part* | *Material* | *Size* |
|---|---|---|---|
| 1 | (A) Top | Mahogany | 1 x 22 x 42 |
| 2 | (B) Drop leaves | Mahogany | 1 x 24 x 42 |
| 2 | (C) Side rails | Mahogany | ¾ x 4 x 36 |
| 2 | (H) End rails | Mahogany | ¾ x 4 x 19 |
| 2 | (F) Hinge rail | Mahogany | 1 x 4 x 21½ |
| 2 | (G) Gate rail | Mahogany | 1 x 4 x 15⅜ |
| 8 | (D), (E) Legs | Mahogany | 1¾ x 1¼ x 29 |

**Regular Chair**

Requirements listed below are for one chair only.

| | | | |
|---|---|---|---|
| 2 | (A) Front legs | Mahogany | 1⅜ x 5 x 18 |
| 2 | (B) Back legs | Mahogany | 1⅜ x 6 x 32 |
| 2 | (C) Side rails | Mahogany | 1⅜ x 3 x 15¼ |
| 1 | (D) Shoulder rest | Mahogany | 3 x 4 x 18 |
| 1 | (J) Bead | Mahogany | 1 x 1 x 18 |
| 1 | (E) Back rest | Mahogany | 1½ x 2½ x 14 |
| 1 | (H), (I) Braces | Mahogany | 1⅜ x 2 x 30 |
| 1 | (F) Front cross rail | Mahogany | 1⅜ x 3 x 16 |
| 1 | (G) Back cross rail | Mahogany | 1⅜ x 2¾ x 14 |

**Armchair**

| | | | |
|---|---|---|---|
| 2 | (A) Front legs | Mahogany | 1⅜ x 5 x 18 |
| 2 | (B) Back legs | Mahogany | 1⅜ x 6 x 32 |
| 2 | (C) Side rails | Mahogany | 1⅜ x 3½ x 17 |
| 2 | (G) Arm rest | Mahogany | 1⅜ x 5 x 6 |
| 2 | (F) Arm rest | Mahogany | 1⅜ x 4 x 16 |
| 1 | (D) Shoulder rest | Mahogany | 3 x 4 x 20 |
| 1 | (L) Bead | Mahogany | 1 x 1 x 20 |
| 1 | (E) Back rest | Mahogany | 2 x 2½ x 15 |
| 1 | (H) Front cross rail | Mahogany | 1⅜ x 3 x 18 |
| 1 | (I) Back cross rails | Mahogany | 1⅜ x 2¾ x 15¼ |
| 1 | (J), (K) Braces | Mahogany | 1⅜ x 2 x 30 |

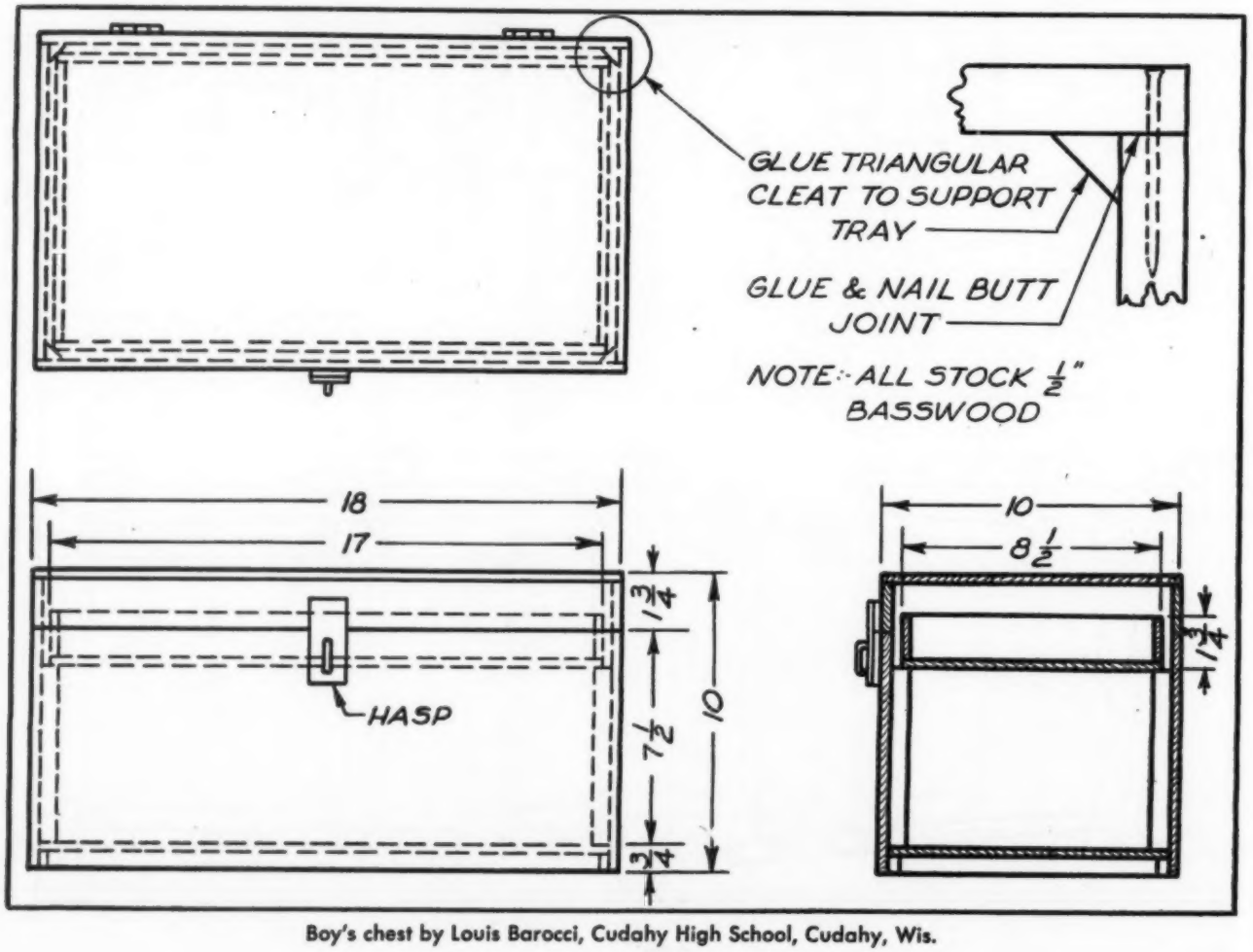
Boy's chest by Louis Barocci

## SHOESHINE BOX

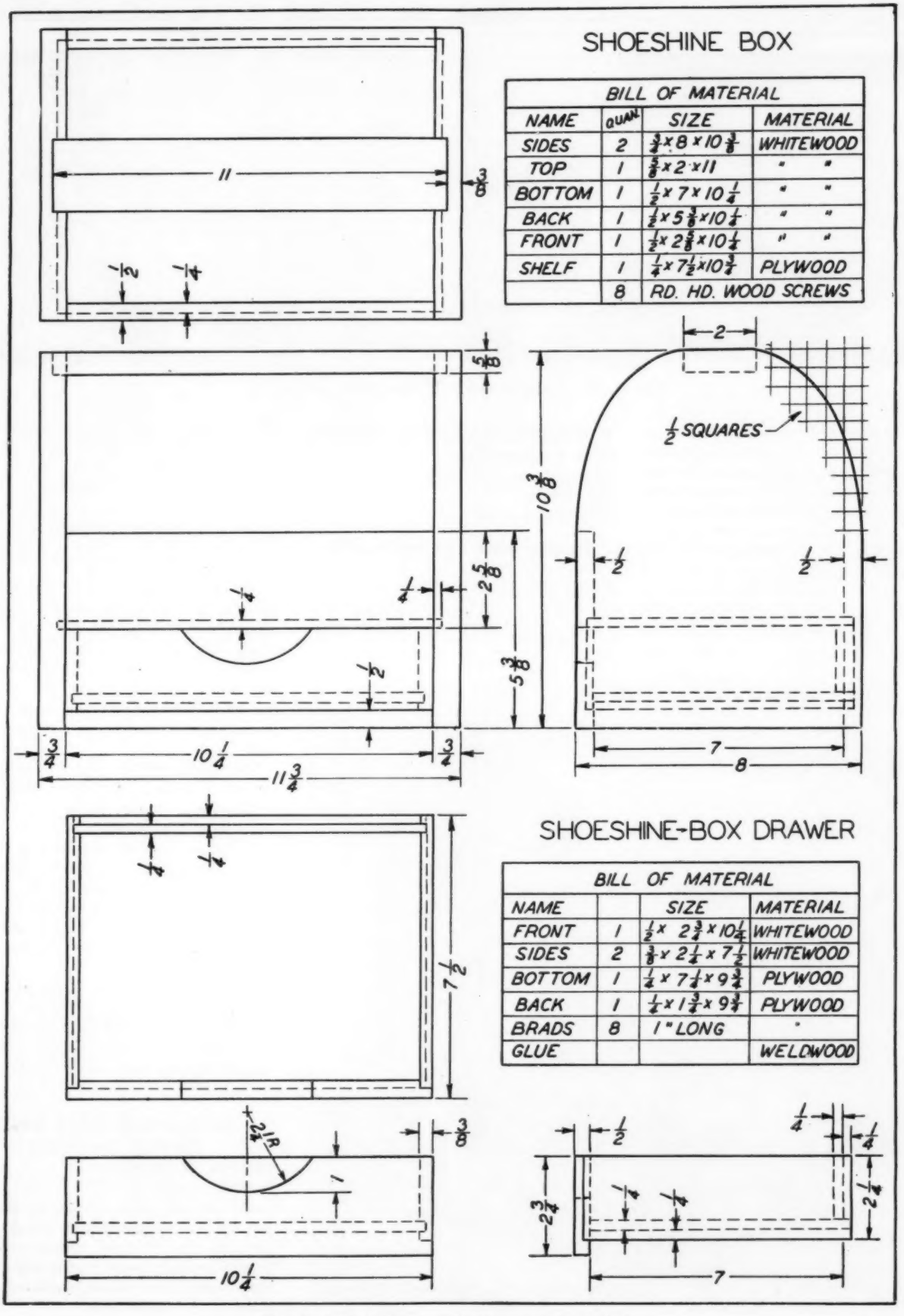
**NORMAND L. METHOT**
Teachers College
Fitchburg, Mass.

A functional project for the school shop, and a valuable asset to any household, is this shoeshine box. Unlike most kits of this type, it is designed and built *around* all of the standard shoeshine equipment that the average home stocks. This design principle, "Form follows function," is frequently neglected in school shop projects.

The drawer is intended to hold either large or small cans of polish, extra shoe laces, ap-




Boy's chest by Louis Barocci, Cudahy High School, Cudahy, Wis.


SHOESHINE BOX
BILL OF MATERIAL
NAME | QUAN. | SIZE | MATERIAL
SIDES | 2 | 3/4 x 8 x 10 3/8 | WHITEWOOD
TOP | 1 | 3/8 x 2 x 11 | " "
BOTTOM | 1 | 1/2 x 7 x 10 1/4 | " "
BACK | 1 | 1/2 x 5 3/8 x 10 1/4 | " "
FRONT | 1 | 1/2 x 2 5/8 x 10 1/4 | " "
SHELF | 1 | 1/4 x 7 1/2 x 10 3/4 | PLYWOOD
| 8 | RD. HD. WOOD SCREWS
11
3/8
1/2
1/4
5/8
2 5/8
5 3/8
10 3/8
2
1/2 SQUARES
1/2
1/2
7
8
3/4
10 1/4
3/4
11 3/4
SHOESHINE-BOX DRAWER
BILL OF MATERIAL
NAME | | SIZE | MATERIAL
FRONT | 1 | 1/2 x 2 3/4 x 10 1/4 | WHITEWOOD
SIDES | 2 | 3/8 x 2 1/4 x 7 1/2 | WHITEWOOD
BOTTOM | 1 | 1/4 x 7 1/4 x 9 3/4 | PLYWOOD
BACK | 1 | 1/4 x 1 3/4 x 9 3/4 | PLYWOOD
BRADS | 8 | 1" LONG |
GLUE | | | WELDWOOD
1/4
1/4
7 1/2
2 1/2 R
1
3/8
10 1/4
1/2
1/4
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2 3/4
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1/4
2 1/4
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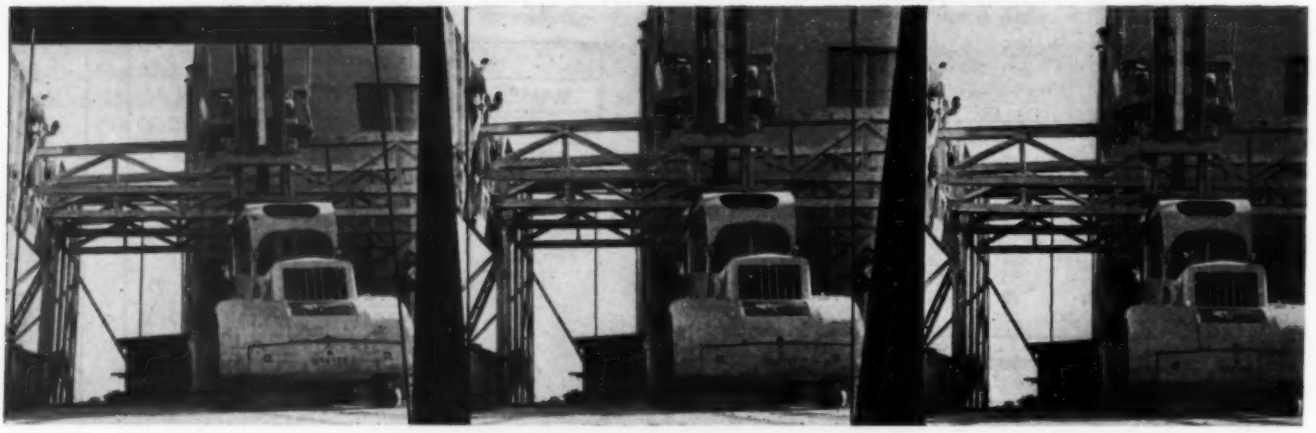
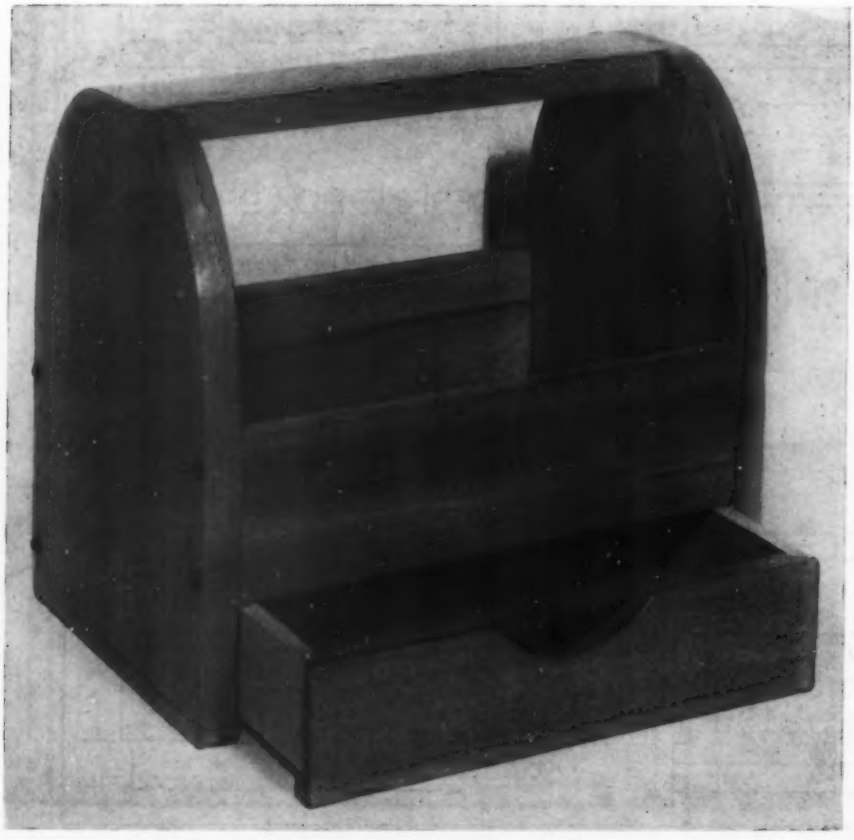
Details of shoeshine box by Normand L. Methot



Getting rid of the converging lines when enlarging

plicator brushes, and odds and ends. The top provides ample space for the convenient storage of polishing cloths and brushes. The foot rest also serves as an excellent carrying handle.

Although small and economical in terms of materials, this project incorporates a surprising number of woodworking and finishing skills. A little more detail is involved in this project than in the run-of-the-mill shoe kit, but the functional uniqueness of the finished product is well worth the extra bit of work.



Shoeshine box by Normand L. Methot

## A PHOTO-ENLARGER LESSON

**STAN SCHIRMACHER**
Industrial Arts Instructor
High School
Cottonwood, Ariz.

### Stepping Down After Raising It Up

Converging vertical lines in photographs taken with cameras tilted upward, as shown in the first picture, can be corrected by an enlarger. The *bottom* edge of the enlarger easel is simply raised until the vertical lines become parallel, as in the second picture.

The vertical lines in the first picture come together at the *V.P.* (vanishing point) somewhere above it. By tilting the easel, the top dimensions are spread out, reversing the location of the *V.P.*, but it is now only in line with the *vertical* frame lines.

The enlarger must focus on the center of the tilted picture and then *stopping down* the diaphragm will bring the top and bottom edges back into focus. Also, because the bottom edge of the photo is now nearer the light source, some *dodging* of the projection will have to be done to hold back the exposure proportionately from the bottom upward.

The extra *wedges* on either side are simply cut off to make a rectangular photo with vertical lines corrected to parallel lines, as shown in the third picture.

The commercial photographer, of course, can *take* the picture with correct vertical lines with a view or press camera that has a rising front. The camera (film) is held vertically and the lens section is raised until it is in line with the center of the film and the center of the view.

The photograph shown in this article pictures the *raising of the rafters* by a motor hoist. The building is a band room being built by the high school students in the *Farm Layout and Construction* class, M. E. Crawford, instructor.

## ALUMINUM SALT AND PEPPER SHAKERS

**GEORGE W. GENEVRO**
Modesto, Calif.

The salt and pepper shaker set described here has been used as a machine-shop project for some time. The fine appearance of the finished product creates interest and the fact that the project is both useful and ornamental makes it welcome at home.

The material used is scrap aluminum that

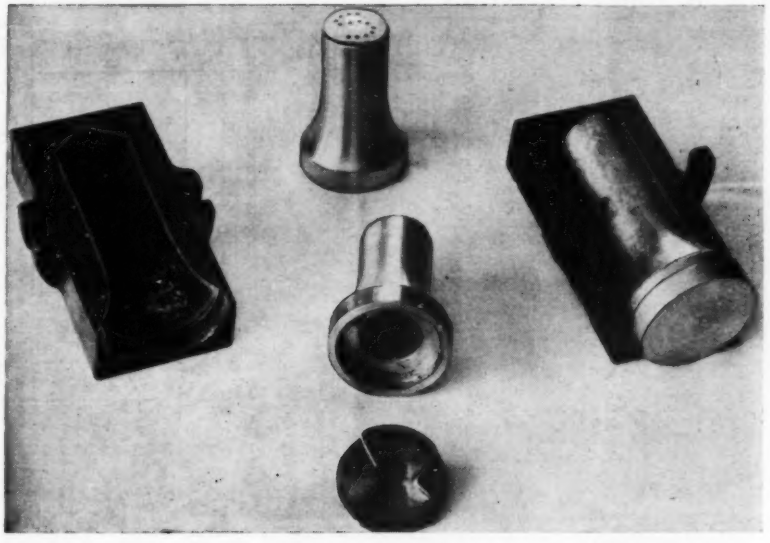
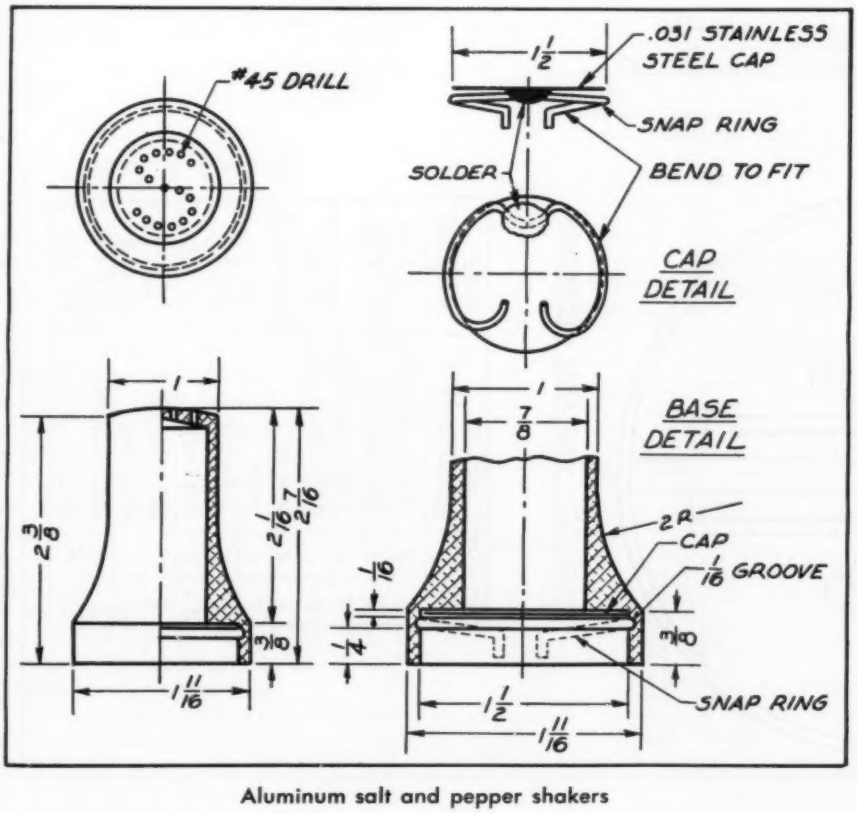


Fig. 1. Mold and casting for salt and pepper shakers

is melted by the students and poured into the permanent mold shown in Figure 1. The mold itself is quite simply made and can be machined by the instructor or by a competent student. Two pieces of 1 by 2 by 4-in. mild steel may be used. These should be keyed together by means of pins or square guides on the outside. Then a hole should be drilled and bored to 1⅛-in. diameter and to a depth of approximately 3½ in. This allows for enough extra metal on the casting for it to be chucked by the stub and then all the machining operations may be done at one setting. The contours of the base may be turned to suit the individual, although a 2-in. radius gives pleasing lines.




Aluminum salt and pepper shakers

**Sequence of Machining Operations**

1. Chuck casting, allowing about 2¾ in. to protrude from the chuck.
2. Face and center-drill the end.
3. Drill to 2⅜-in. depth with a ⅜-in. drill.
4. Drill to 2⅜-in. depth with a ⅞-in. drill ground to 150 degrees included angle at the point.
5. Counterbore to 1½-in. dia., ⅜ in. deep.
6. Cut groove for snap ring.
7. Turn outside diameter to 1 11/16 in.
8. Turn outer contour.
9. Cut off to length of 2 7/16 in. with parting tool.
10. Machine top of shaker to a slight crown.
11. Lay out and drill *S* and *P* with a No. 45 drill.
12. Make cap from stainless steel sheet.
13. Make snap ring to shape shown and solder to cap. Use .040-in. diameter piano wire for snap ring.
14. Polish with buffer and assemble.

## SHOULDER AND ARM EXERCISER

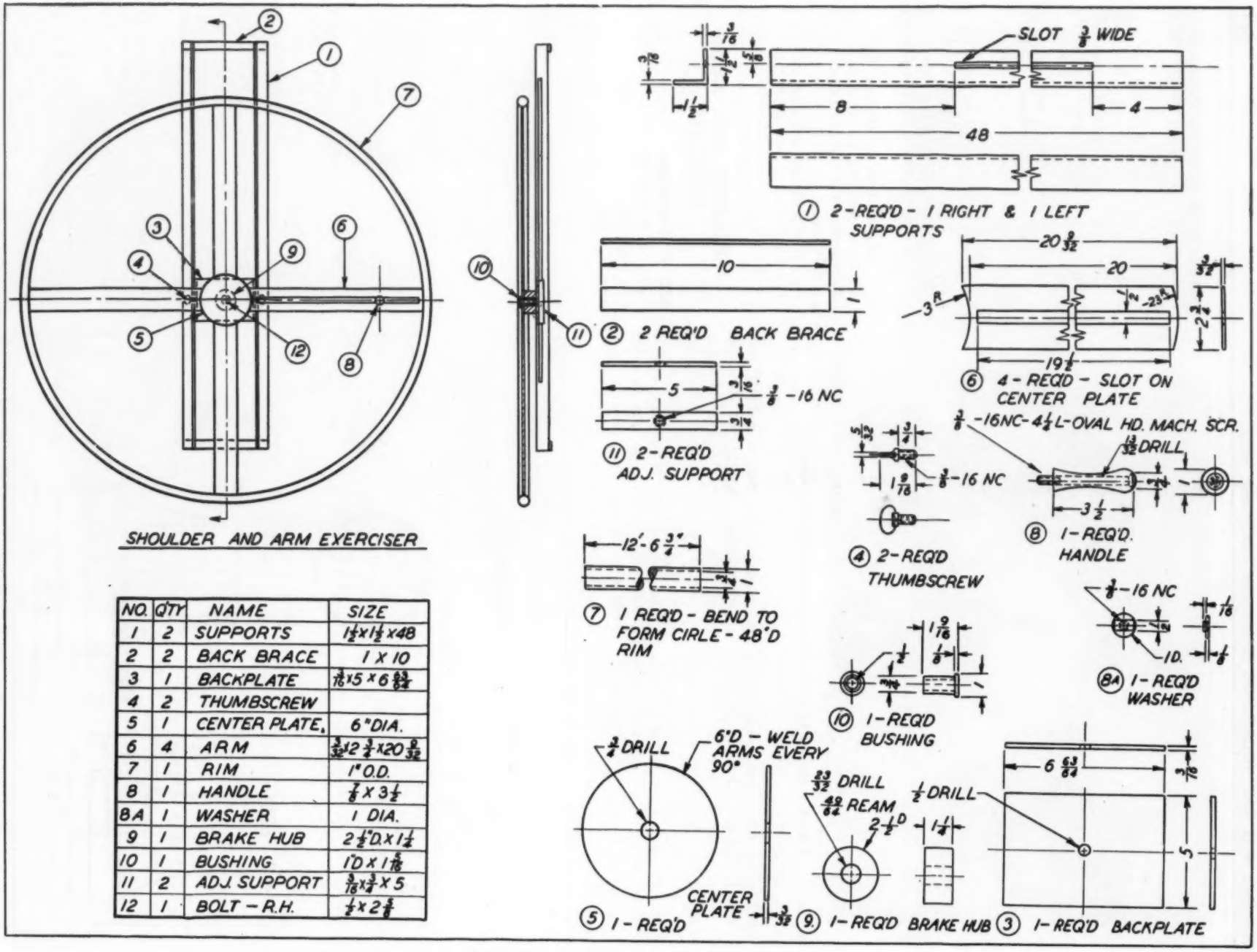
**GEO. N. DUERKSEN**
Instructor of Drafting
East High School
Wichita, Kans.

I was informed by a member of our local chapter of the National Foundation for Infantile Paralysis that the local hospitals have great need for an arm and shoulder exerciser. This piece of equipment is especially needed by physical therapy departments for polio victims. From the board members' sketch, one of the drafting students designed and detailed the exerciser. Upon approval the welding instructor and his students fabricated the project. The accompanying picture shows the exerciser mounted in a local hospital as it is used by a polio patient. The person on the left is the originator of the idea and the one on the right is the student that made the drawings and specifications for the fabricating shop.

It will be noted that there are two adjustments. The frame which is mounted to a vertical wall, permits the lowering and raising of the wheel. The grip is adjusted between the hub and the rim to suit the patient's reach. Exercising consists of rotating the wheel either clockwise or counterclockwise. Tension is applied to the brake hub to make rotating harder if desired.

Two exercisers were fabricated and given one each to two separate hospitals. It might be said here that presently they are used daily.

This project served wonderfully as an ad-




| NO. | QTY | NAME | SIZE |
|---|---|---|---|
| 1 | 2 | SUPPORTS | 1½x1½x48 |
| 2 | 2 | BACK BRACE | 1 X 10 |
| 3 | 1 | BACKPLATE | 3/16x5 x 6 63/64 |
| 4 | 2 | THUMBSCREW | |
| 5 | 1 | CENTER PLATE. | 6"DIA. |
| 6 | 4 | ARM | 3/32x2 3/4x20 9/32 |
| 7 | 1 | RIM | 1"O.D. |
| 8 | 1 | HANDLE | 3/8 X 3½ |
| 8A | 1 | WASHER | 1 DIA. |
| 9 | 1 | BRAKE HUB | 2½"D.X1¼ |
| 10 | 1 | BUSHING | 1"D X 1 5/16 |
| 11 | 2 | ADJ. SUPPORT | 3/16x¾ X 5 |
| 12 | 1 | BOLT – R.H. | ¼x2⅜ |

Details of shoulder and arm exerciser



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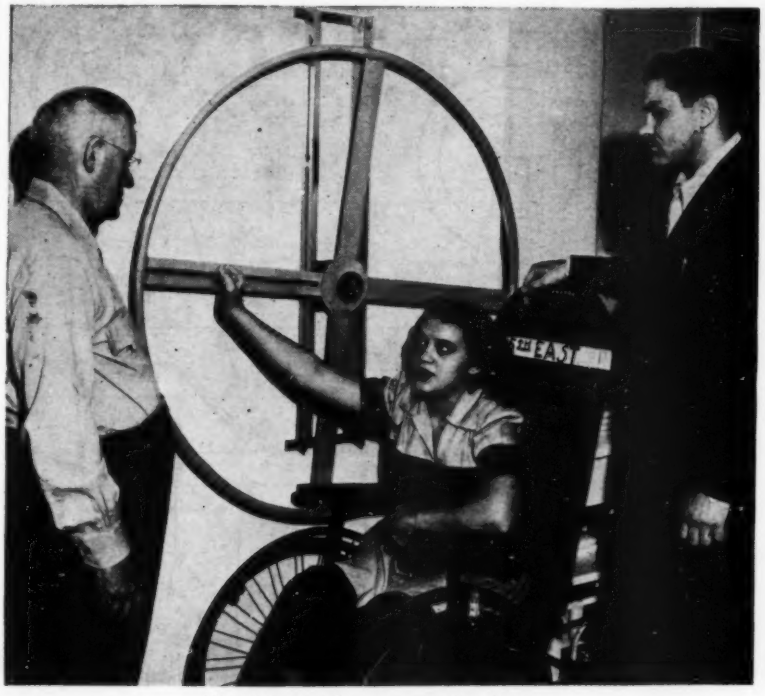


Shoulder and arm exerciser in use

vanced problem in design for a senior drafting student, a fine medium to co-ordinate the work of the drafting room and the welding department along with some machine-shop applications.

All parts were assembled by a continuous all-round bead. The axle (½ in. in diameter by 2⅝-in. bolt) is welded to Item 3, the backplate.

## SNOW SHOVEL

**HERBERT W. YANKEE**
**High School**
**Stratford, Conn.**

The snow shovel described in this article can be made very inexpensively by utilizing metal cut from trunk covers, hoods, or doors from old discarded automobiles. The curvature of the blade can be obtained by selecting that part of the automobile which matches the desired curve.

The strap stock that forms the handle strap and the piece which attaches the handle to the blade, can also be obtained from junk cars. To add more rigidity and safety, a 4-in. length of ½-in. black iron pipe is welded to the handle strap. If welding facilities are not available, the pipe can be plugged with a birch dowel and a carriage bolt can be used to fasten the pipe to the strap.

The wood handle is made from a 1¼ square piece of oak, hickory, or maple, 33 in. long.

If it is desired to make the shovel from sheet iron, No. 18 gauge is recommended for the blade and ⅛ by ⅞-in. strap iron for the handle strap.

All sharp corners on the handle, blade, and handle strap should be removed so as to provide maximum safety. Rivets are used for fastening the various parts together.

## COLONIAL LAMP

**CARL SMUGORZEWSKI**
**Buffalo, N. Y.**

An example of the practical uses found in discarded milk bottles is demonstrated by this porch light. The bottle serves as the core with the lamp being built around it.

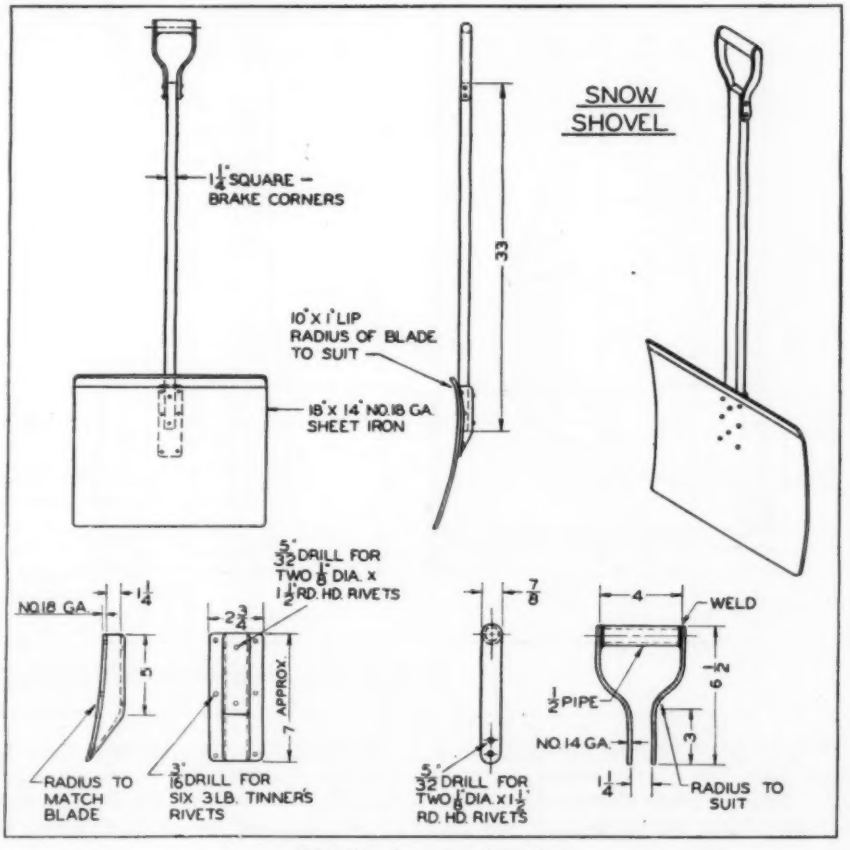
Jars of other shapes and sizes can be used following a similar design.

To cut the bottle, tie a piece of gasoline soaked string around it; ignite the string; then dip the jar into cold water. The glass will crack along the line of the string.

Frost the glass by rubbing the jar on a cast iron plate using a silicon carbide abrasive and water.

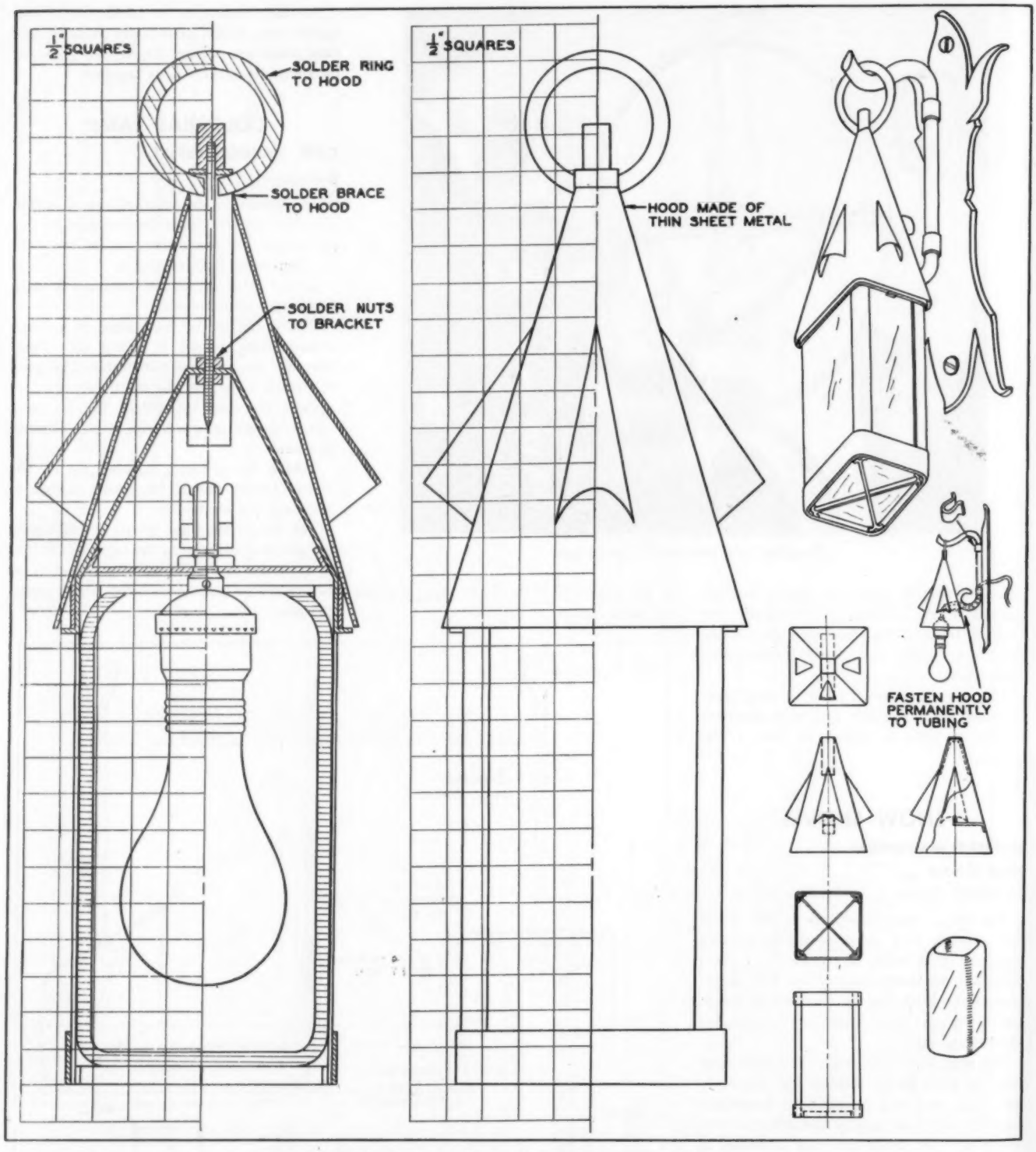
Tubing, 5/16 or ⅜ in., conceals the electric wiring (which should be plastic coated to withstand the elements).

The hood (thin sheet metal) is held rigidly by soldering the ring to the tubing as well as to the brace, and by soldering the hood to the tubing at the point where the wiring comes through.




Details of snow shovel

Details of shoulder and arm exerciser



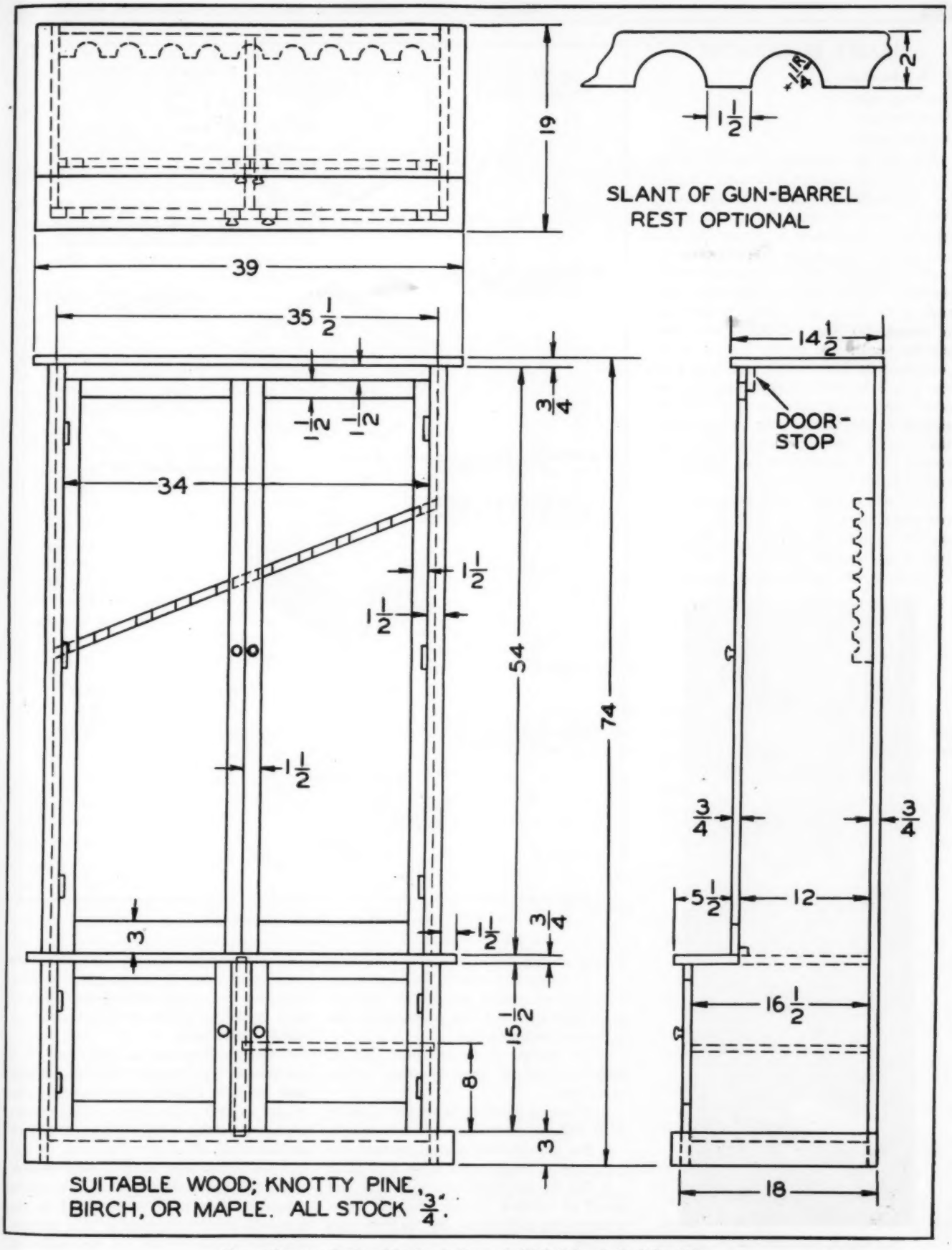

Colonial lamp designed by Carl Smugorzewski

The tubing is fastened against a forged metal plate. This plate is slightly convex to allow the metal bands which hold the tubing, to pass through slits in the plate, and then bent.

To change bulbs once the light is up, unscrew the cylindrical cap within the ring at the point of the two nuts. The carriage (made of band iron) will then drop off, leaving the socket unobstructed.

A flat black paint is recommended as the final finish.

This lamp was made as an original project in the metal shop of the Buffalo State Teachers College.




Gun cabinet submitted by Louis Barocci, High School, Cudahy, Wis.

## HANDY BLUEPRINTER

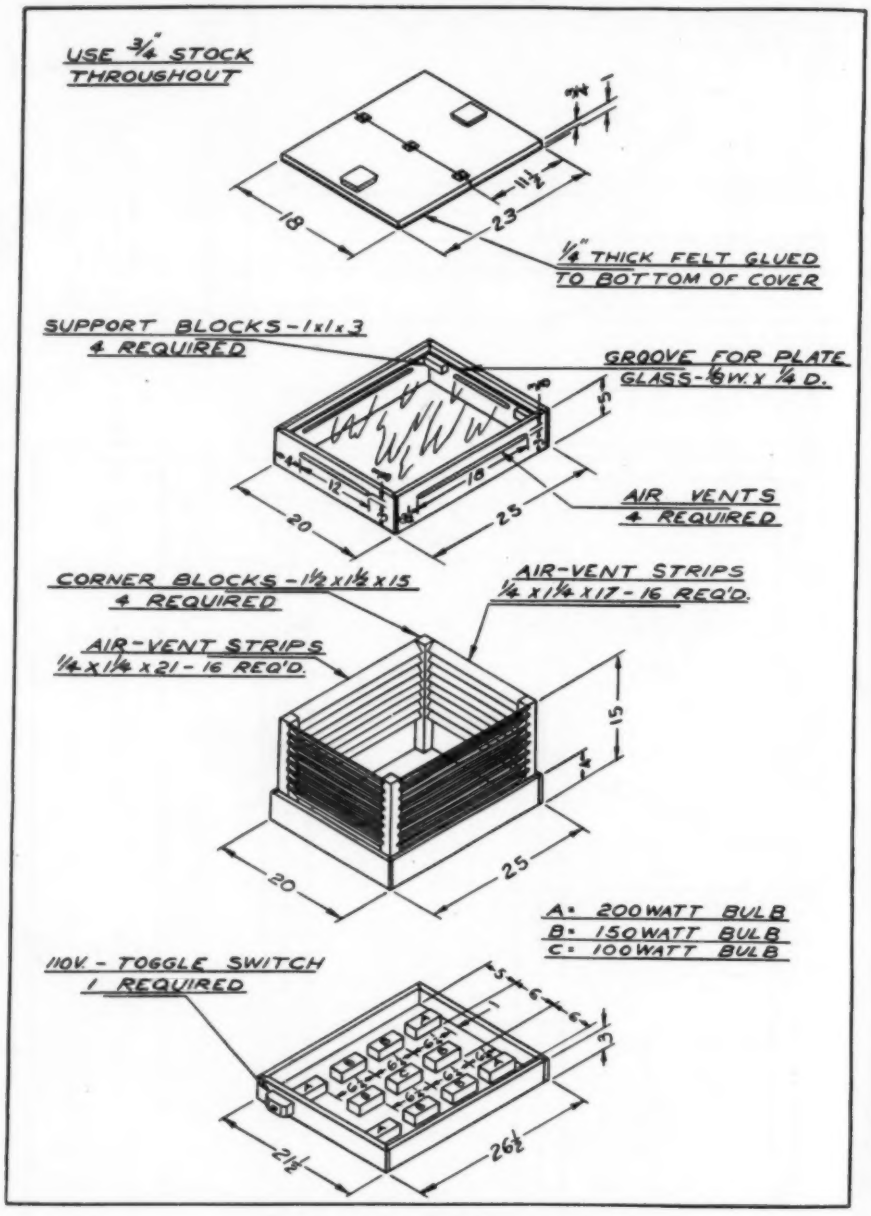
**D. R. Sherman**
Drafting Instructor
High School
Alpena, Mich.

Although most teachers would like to include a unit of blueprinting or some comparable reproductive process in their mechanical drawing course of study, this is often rather impractical. There seem to be two chief reasons for this: (1) regular blueprinting equipment is expensive, and (2) the "sun frame" process is highly unpredictable since, especially in the winter, it is difficult to determine in advance the most suitable day for blueprinting because the process itself is so dependent on the weather. This quite often gives rise to a situation in which blueprinting and other reproductive processes are relegated entirely to the lecture stage. To overcome this situation, the writer developed a blueprinter that is economical and yet does a creditable job.

Since the majority of drawings made at our school are 17 x 22 in. or smaller, it was decided to make the blueprinter sufficiently large to accommodate prints of that size.

There are four main parts to the printer.

The handy blueprinter in use


USE 3/4" STOCK THROUGHOUT
18
23
1/4" THICK FELT GLUED TO BOTTOM OF COVER
SUPPORT BLOCKS - 1x1x3 4 REQUIRED
GROOVE FOR PLATE GLASS - 1/8 W. x 1/4 D.
20
25
AIR VENTS 4 REQUIRED
CORNER BLOCKS - 1 1/2 x 1 1/2 x 15 4 REQUIRED
AIR-VENT STRIPS 1/4 x 1 1/4 x 17 - 16 REQ'D.
AIR-VENT STRIPS 1/4 x 1 1/4 x 21 - 16 REQ'D.
15
20
25
A. 200 WATT BULB
B. 150 WATT BULB
C. 100 WATT BULB
110V. - TOGGLE SWITCH 1 REQUIRED
21 1/2
26 1/2

Details of the handy blueprinter

Starting at the bottom, there are the base unit, ventilating unit, printing unit, and cover. None of these present any difficult construction problems but there are several points that might well be emphasized.

1. The bottom of the base unit may be either plywood or glued-up stock. Either works well.

2. All wiring should be in parallel to permit ready replacement of faulty bulbs or sockets.

3. The printing unit must fit perfectly for any strain on the glass will cause it to crack.

4. The support blocks of the printing unit should be fastened securely since the entire weight of the printing unit and the cover rests on them.

5. It is essential that the cover be made of plywood since any warping in the cover will allow the tracing and blueprint paper to *belly up* instead of laying flat. This will result in a poor print.

6. Clear glass should be used rather than the frosted type. Frosted glass will diffuse light which, in a sense, is an advantage, but it also requires much larger bulbs to make any given printing in the same length of time as clear glass.

7. Since the bulbs have a total wattage rating of 1500, a great deal of heat will be generated. This must be dissipated or the glass will crack; consequently, it is essential that the ventilating unit and the ventilating

slots in the printing unit be made at least as large as indicated in the drawing. If it is desired to increase the bulb size the ventilating slots must be made larger.

8. It might also be found helpful to glue a piece of heavy felt or light carpeting on the bottom of the cover. Using a material such as this tends to press the tracing and blueprint paper down more evenly since the nap of the material fills in hollows and air spaces. A better quality print usually results.

Although this blueprinter is no faster than the *sun frame* process, it has several advantages over it. First, it may be used the year round — any hour of the day or night. Secondly, because of its divided cover, two smaller prints having different exposure times may be made at the same time. Either may be replaced without, in the least, disturbing the other. Thirdly, it is possible to locate all the blueprinting equipment in one corner thereby increasing efficiency by eliminating unnecessary trips on the part of the student.

The cost of building the blueprinter is small, coming to less than twenty dollars. The electrical equipment will be the most expensive single item. Good quality surface type switches and sockets will cost approximately one dollar. Quite often much of this needed equipment may be found around the school and shop. In any event the cost of building this printer is so small compared to buying one that few administrators will complain.

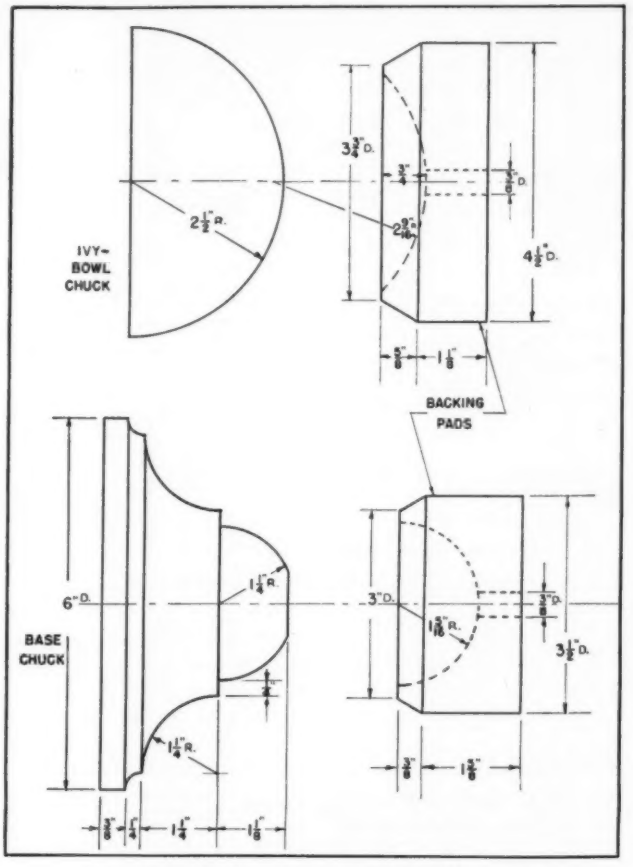



Fig. 1. Spinning chucks and backing pads

## SPUN METAL SCALES

**L. BRYCE HARDEMAN**
**Assistant Professor in Industrial Education**
**A. & M. College of Texas**
**College Station, Tex.**

Metal spinning is becoming an increasingly popular phase of industrial arts, both to the teacher and to the student. One reason for this popularity is that metal spinning can be done in a modestly equipped shop without the addition of expensive equipment.

The minimum requirements are: (1) a wood or metal lathe, (2) a frictionless center, (3) a spinning tool of hickory about 20 in. long or longer (an old sledge hammer handle will do), and (4) a large, worn-out file which has been sharpened to resemble a chisel (this is used for trimming the metal at the edge).

A very unique project which involves the art of metal spinning is the balance scales shown. The design is a copy from the old original apothecaries' scale dating back several centuries. The scales may be made of brass, copper, or aluminum at very little cost, yet they produce an antique and expensive appearance. By making two sets of bowls a dual purpose may be obtained. Use smaller, deeper bowls for growing plants; larger bowls for fruit, nuts, or flower arrangements.

**BILL OF MATERIALS**
**(For planter-type brass scales)***

| *No. Required* | *Item* | *Description* |
|---|---|---|
| 1 | Brass disk | 7¼" dia. No. 22 gauge, soft yellow |
| 2 | Brass disk | 6½" dia. No. 22 gauge, soft yellow |
| 1 | Brass round (bar) | 1¼" dia., 12" long |
| 1 | Brass round (bar) | ¾" dia., 2" long |
| 1 | Brass flat (bar) | ⅛ x 1 x 12" long |
| 2 | Brass disk | ¾" dia. No. 22 gauge, soft yellow |
| 2 | Brass hooks | 3/32" dia., 1½" long, brass welding rod |
| 6 | Brass ball or "S" chain | ¼", 10" long |
| 1 | Bolt | ⅜ x ¾" round head — steel |
| 1 | Washer | ⅜" |

The scales may be made of a variety of materials including brass, copper, and aluminum. Brass or copper is more antique looking. However, aluminum is very attractive and much easier to spin. The most expensive part of the scale is the vertical column, which is turned from solid bar stock. To cut the cost of materials there are several variations in the making of this column. These variations are:

1. A column turned of mahogany or other suitable hardwood.
2. A column using both metal and wood.
3. A column using metal tubing.

The following steps suggest an efficient and easily followed plan of procedure:

1. Select hardwood stock for spinning chucks and backing pads. Hard maple is preferable. See Figures 1 and 2.

2. Fasten the chuck stock securely to the lathe faceplate. Turn it to the size and shape desired.

3. Turn the backing pads to the shape desired. One each of 1 in., 3½ in., and 5½ in. in diameter is needed. Allow 1/16-in. clearance for the sheet brass.

4. Cut three disks of 22 gauge soft yellow brass. Make one 7¼ in.; the other two, 6½ in. in diameter.

5. Center one of the 6½-in. brass disks on the chuck, using a 1-in. backing pad to hold the disk in position.

*To make the dual purpose scales using two sets of bowls for which two more disks of 22 gauge brass, 8 in. in diameter, are needed.

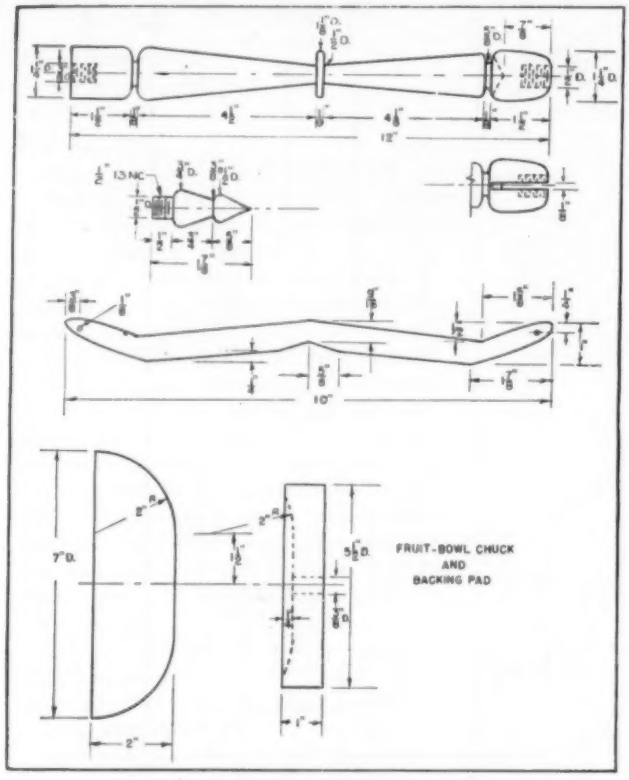



Fig. 2. Scale shaft and crossbar details (also fruit-bowl chuck)

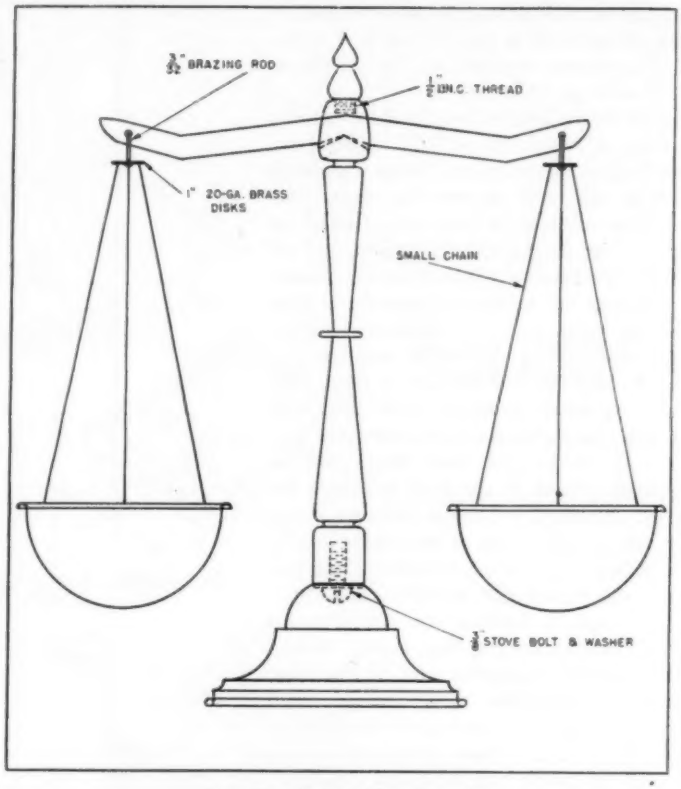



Fig. 3. Assembly of scales

6. Spin the bottom portion of the bowl to approximately 4 in. in diameter. Lubricate it often with beeswax, tallow, soap, or heavy grease.

7. Remove the bowl from the lathe and anneal by heating it to a very dull red color and then quenching it in water. CAUTION: Do not heat further as the melting point is near.

8. Replace the bowl in the lathe. Hold it in position with the 4-in. backing pad. Lubricate and spin until the brass begins to harden.

9. Remove the bowl and anneal as often as is necessary to keep the metal soft enough to spin well. NOTE: The bowl will need anneal-

Fig. 4. Scales with ivy planters

Fig. 5. Scales with fruit bowls

ing approximately six times during the total spinning process.

10. Sand the bowl with No. 3/0 silicon carbide or aluminum oxide abrasive paper while it is still in the lathe. Allow some lubricant to adhere to the abrasive paper; this gives the metal a higher gloss finish, and eliminates a "frosted" appearance.

11. Remove the bowl from the lathe. Repeat steps 5, 6, 7, 8, 9, and 10, using the second 6½-in. disk.

12. Replace the bowl chuck with the base chuck.

13. Spin and sand base in the same manner as the bowls. Drill a ⅜-in. hole in center of base.

14. Cut a piece of 1¼-in. round brass bar to 12-in. length, and center drill the ends for turning in a metal lathe.

15. Place 12-in. bar between centers in lathe and turn to desired shape. While still in lathe, sand with No. 3/0 abrasive paper.

16. Drill and tap ½-in. NC thread in top end of the vertical column.

17. Drill and tap ⅜-in. NC thread in bottom end of column.

18. While holding between softwood blocks in a vise, saw a ⅛-in. wide slot in the top of the column as shown.

19. Cut a piece of ¾-in. round brass bar to 2-in. length to be used for knob on top of shaft.

20. Place bar in lathe chuck and turn to a diameter of ½ in. for a distance of ½ in. Turn ½-in. NC thread to the shoulder of knob, and remove from lathe.

21. Place a ½-in. NC square nut in a four-jaw chuck and screw knob into nut.

22. Turn knob to desired shape.

23. Cut a piece of ⅛-in. brass to a size 1 by 12 in. to be used for crossbar.

24. Cut crossbar to shape as shown on drawing.

25. Cut two ¾-in. disks from 22-gauge brass and drill holes as shown on drawing.

26. Form two hooks from $\frac{3}{32}$-in. brass welding rod as shown on drawing.

27. Cut six pieces of brass chain — each piece 10 in. long.

28. Buff all of the parts with a buffing wheel.

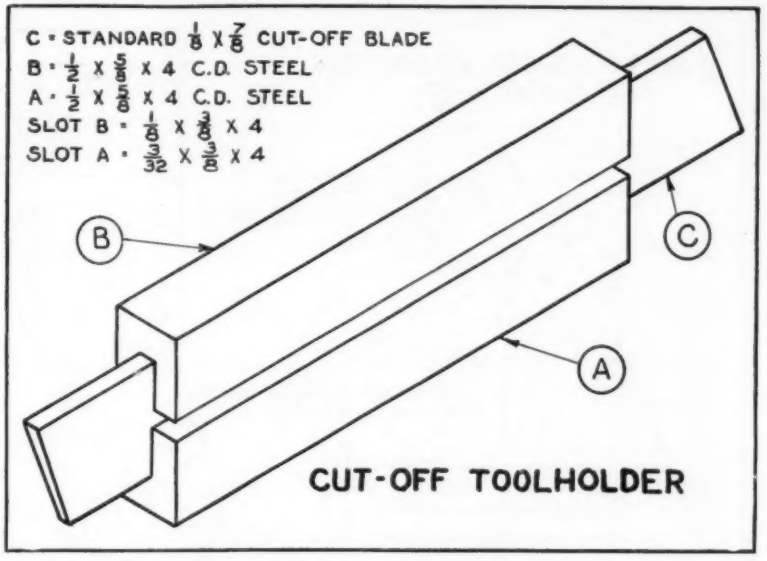
29. Apply clear lacquer to all polished areas.

30. Assemble the scales according to drawing.

## CUTOFF TOOLHOLDER

**HERBERT L. SHEAR**
Warsaw, N. Y.

The cutoff toolholder shown, was designed for use on an 8-in. shaper. A similar fixture could be made for a lathe or other types of machines equipped with tool posts of varying sizes. The sizes of the parts described in this article, would, of course, have to be changed to suit.




Cutoff toolholder by Herbert L. Shear

Saturday and Sunday remain the most dangerous days of the week in traffic.

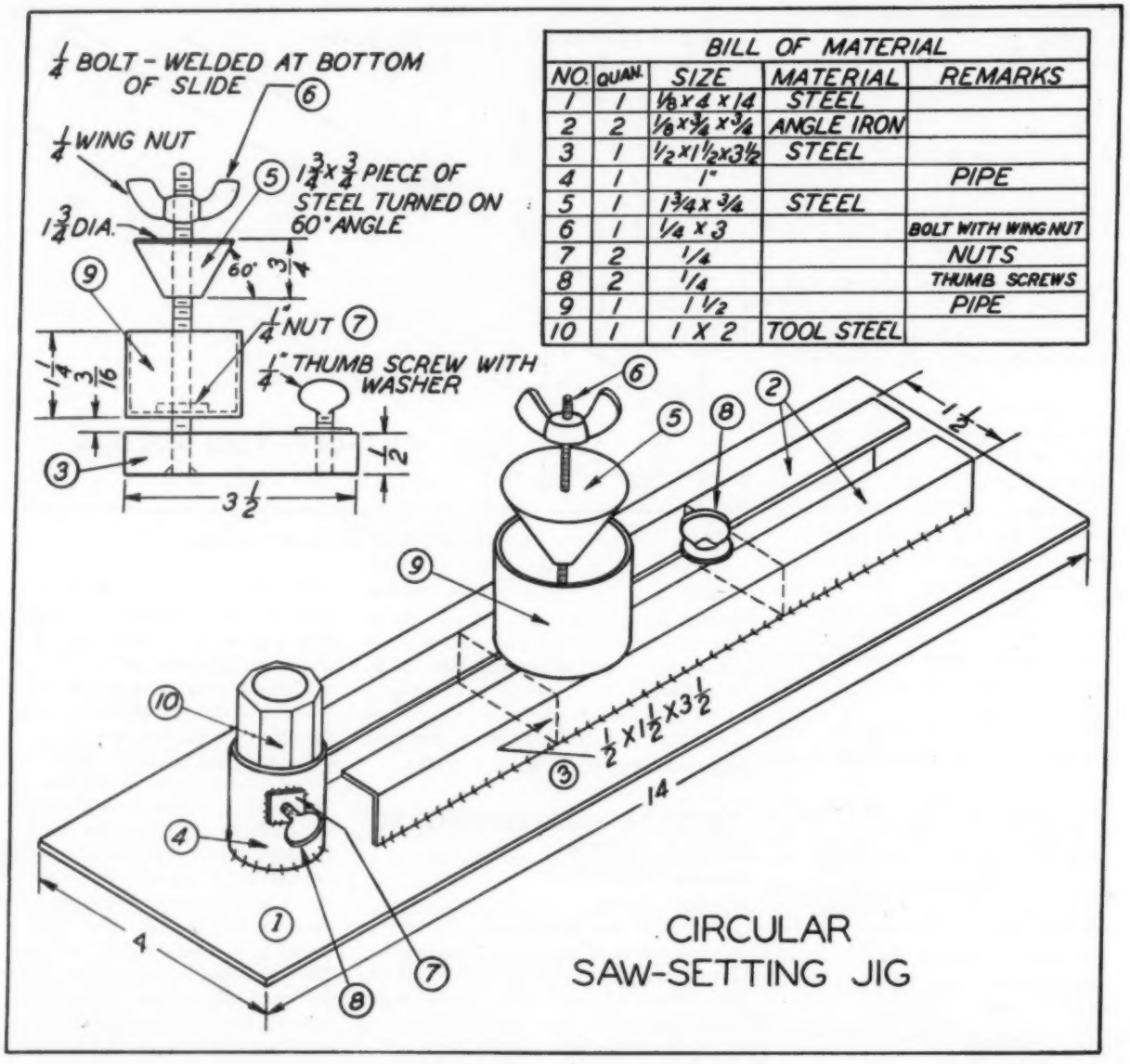
## CIRCULAR SAW SETTING JIG

**DAVID L. WATKINS**
Stratford High School
Stratford, Conn.

Very often shop people hesitate to sharpen the blades on their circular saws because they have no adequate jig with which to set the teeth. The writer was having the same difficulty until he hit upon the idea of making the jig shown herewith.

He took two pieces of ⅛ by ¾ by ¾-in. angle iron and welded them to a plate of steel ⅛ by 4 by 14 in. to make the slides for the saw holder. The slide part of the saw holder is a piece of steel ½ by 1½ by 3½ in., with two holes drilled and tapped for ¼-in. screws while the part the saw rests on is a piece of 1½-in. pipe with a bottom welded to it, and a ¼-in. tapped hole through the center of the bottom, and it is locked in place on the ¼-in. bolt by screwing a nut down tight on the inside of the pipe. The saw, while being set, rests on the top edge of this piece of pipe and is held in place while being rotated, by the piece of ¾ by 1¾-in. steel which has been turned to a cone shape on a 60-deg. angle. The cone is held in place by the wing bolt and the entire unit is kept from moving by the ¼-in. thumb screw, which screws down tightly on the top of the pieces of angle iron.

Circular saw-setting jig




BILL OF MATERIAL

| NO. | QUAN. | SIZE | MATERIAL | REMARKS |
|---|---|---|---|---|
| 1 | 1 | ⅛ x 4 x 14 | STEEL | |
| 2 | 2 | ⅛ x ¾ x ¾ | ANGLE IRON | |
| 3 | 1 | ½ x 1½ x 3½ | STEEL | |
| 4 | 1 | 1" | | PIPE |
| 5 | 1 | 1¾ x ¾ | STEEL | |
| 6 | 1 | ¼ x 3 | | BOLT WITH WING NUT |
| 7 | 2 | ¼ | | NUTS |
| 8 | 2 | ¼ | | THUMB SCREWS |
| 9 | 1 | 1½ | | PIPE |
| 10 | 1 | 1 X 2 | TOOL STEEL | |

Details of circular saw-setting jig

The anvil holder is a piece of 1-in. pipe welded to the plate and the anvil is held in place with the ¼-in. thumb screw.

The anvil is made from 1-in. octagonal tool steel and may be turned to any angle desired.

## A NEW ALLWOOD HARDBOARD

Allwood hardboard, manufactured by the Oregon Lumber Company, is now obtainable in a variety of sizes, thicknesses, and in both treated and standard grades. It was developed after years of research into the chemical properties of ordinary waste slabwood. The new Allwood process produces a hardboard of sustained quality and strength. This is attributed to the utilization of the natural waxes and resins in the slabwood itself.

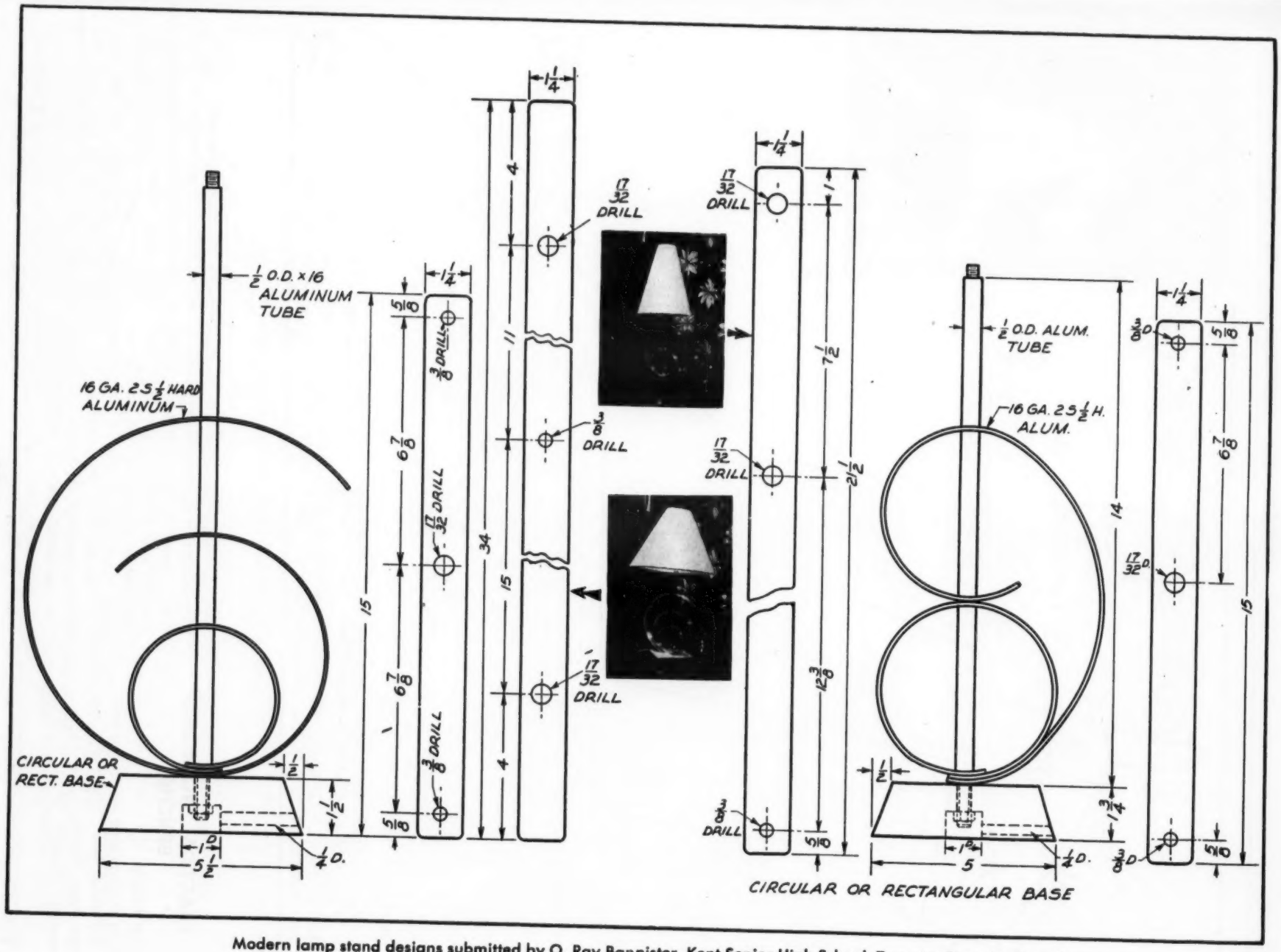
Allwood hardboard possesses dimensional stability and is suitable for all structural and decorative purposes. Specially treated hardboard is being produced for hard surface and exterior use. The new hardboard comes with one smooth surface and in treated form can be used for linoleum base with the screened side up for good adhesion.

Allwood can be used for such applications as concrete forms, flooring — both sub and top applications — table tops, cabinet doors, radio and television cabinets backs, furniture panels, and many other uses calling for a strong, lightweight board which can be sawed, routed, nailed, drilled, or planed without shredding, chipping, or splitting. This new hardboard is produced in all popular sizes and thicknesses.

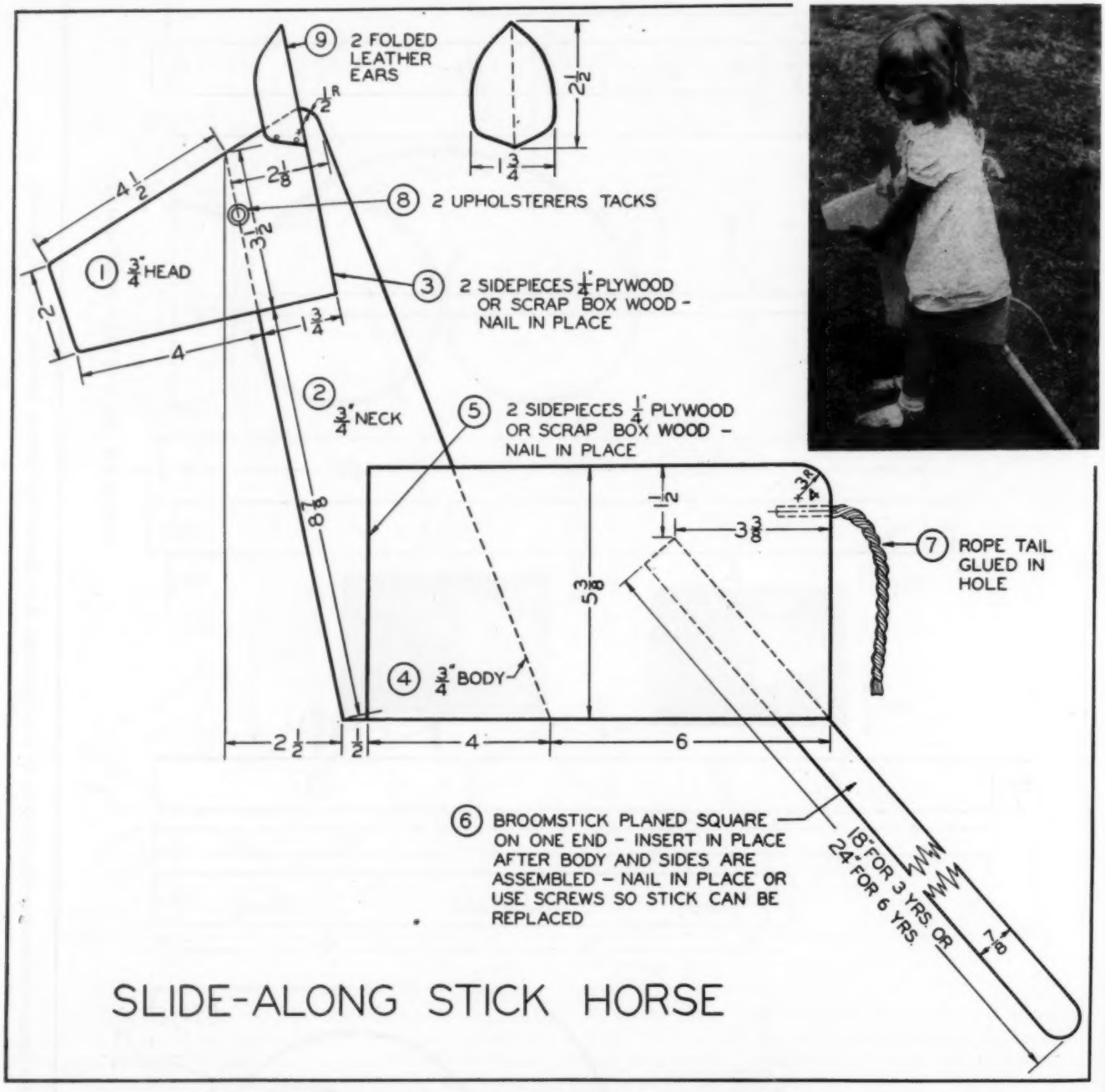
Its low cost, and ready availability make it a suitable substitute for some of the materials that are now scarce.

The new Allwood hardboard possesses ready workability, exceptional strength and durability, and it lends itself readily to numerous forms of decorative treatment.

Oregon Lumber Company, who have long been in the business of producing John Day packaged door and window trim, produce Allwood hardboard at Dee, Ore. National sales and promotion of the new hardboard will be conducted exclusively by Simpson Logging Company sales offices in Seattle, San Francisco, Los Angeles, New York, Chicago, Fargo, Kansas City, and Shrevesport through regular distributor-dealer channels.




Modern lamp stand designs submitted by O. Ray Bannister, Kent Senior High School, Toronto, Ontario, Canada


9 2 FOLDED LEATHER EARS
8 2 UPHOLSTERERS TACKS
1 3/4" HEAD
3 2 SIDEPIECES 1/4" PLYWOOD OR SCRAP BOX WOOD - NAIL IN PLACE
2 3/4" NECK
5 2 SIDEPIECES 1/4" PLYWOOD OR SCRAP BOX WOOD - NAIL IN PLACE
7 ROPE TAIL GLUED IN HOLE
4 3/4" BODY
6 BROOMSTICK PLANED SQUARE ON ONE END - INSERT IN PLACE AFTER BODY AND SIDES ARE ASSEMBLED - NAIL IN PLACE OR USE SCREWS SO STICK CAN BE REPLACED
18" FOR 3 YRS. OR 24" FOR 6 YRS.
SLIDE-ALONG STICK HORSE

Slide-along stick horse by Stan Schirmacher, Cottonwood, Ariz.

## PRACTICAL WOODSHOP BENCHES

**JACK DOWN**
Head of Vocational Woodshop and Industrial Arts
Pago Pago, Tutuila
American Samoa

I can still remember the dire consequences due anyone who damaged one of the solid maple tops of our high school shop benches. I remember well also, the many students to whom I have handed a plane iron and said, "Scrape!" as I pointed to some dent or disfigurement on a maple top of a bench at my recent stateside school. I have often wondered if it were worth all the trouble and now I believe I have the answer.

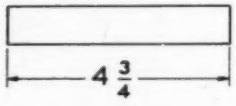
As part of the equipment I found here, I had many rough but rugged benches made from 2 by 6's. We have one nice hard top bench off to one side that is kept for any special jobs that require a flat, smooth surface. The rest of the benches can have stops or boards nailed to them; glue spilled upon them; nicks sawed from them; holes accidentally drilled in them, etc., without anyone caring at all. They are kept clean and they do not make the room look messy. I am sure they do not foster any slovenly work habits.

Especially for beginners I think they are far better than the benches with a piano finish that are kept in many high school shops.

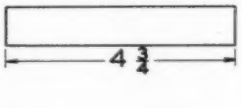
# Do's and Don'ts in Dimensioning

**HERBERT W. YANKEE**
High School
Stratford, Conn.

DO



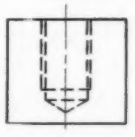

DON'T



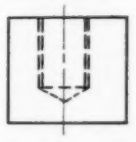

**EXPLANATION**

WHENEVER POSSIBLE LEAVE AT LEAST 3/8" BETWEEN THE OBJECT AND DIMENSION LINE. DON'T CROWD.

DO



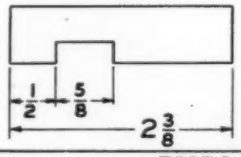
DON'T



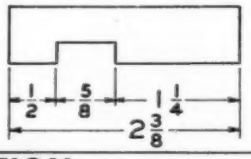
**EXPLANATION**

SHOW TAP DRILL EXTENDING BELOW TAP UNLESS A BOTTOMING TAP IS SPECIFICALLY NEEDED. THIS ELIMINATES AN EXTRA TAPPING OPERATION.

DO



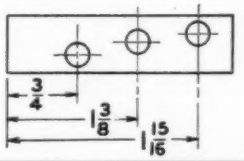

DON'T



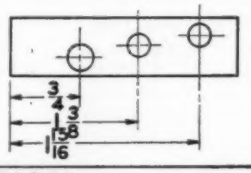

**EXPLANATION**

AVOID USING TIE-UP DIMENSIONS. BECAUSE THERE IS A TOLERANCE ON EACH FRACTION, DIMENSIONING IN THIS MANNER ALLOWS ACCUMULATION OF ERROR.

DO



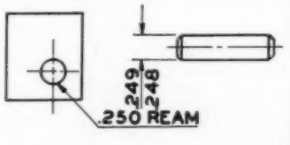

DON'T




**EXPLANATION**

STAGGER DIMENSIONS WHEREVER POSSIBLE. DIMENSIONS PLACED IN LINE TEND TO CONFUSE.

DO

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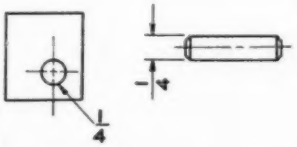
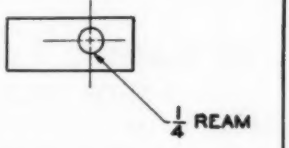



**EXPLANATION**

IN THIS CASE, A SUPERFIT IS DESIRED. BY USING FRACTIONS, THE RESULT MAY BE EITHER A LOOSE OR A TIGHT FIT, DEPENDING UPON THE WORKMAN. ELIMINATE ERROR.

DO

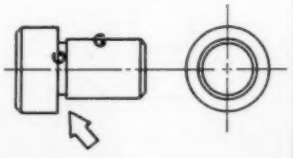
DON'T



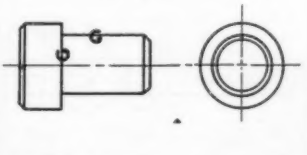

**EXPLANATION**

A FRACTIONAL DIMENSION ORDINARILY MEANS ±1/64". TO PREVENT POSSIBLE ERROR STATE REAMER SIZE DECIMALLY.

DO



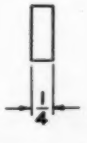
DON'T



**EXPLANATION**

WHEN A DIAMETER IS GROUND TO A SHOULDER, SHOW A RELIEF ELIMINATING THE SMALL RADIUS FORMED BY THE GRINDING WHEEL UNDER THIS CONDITION.

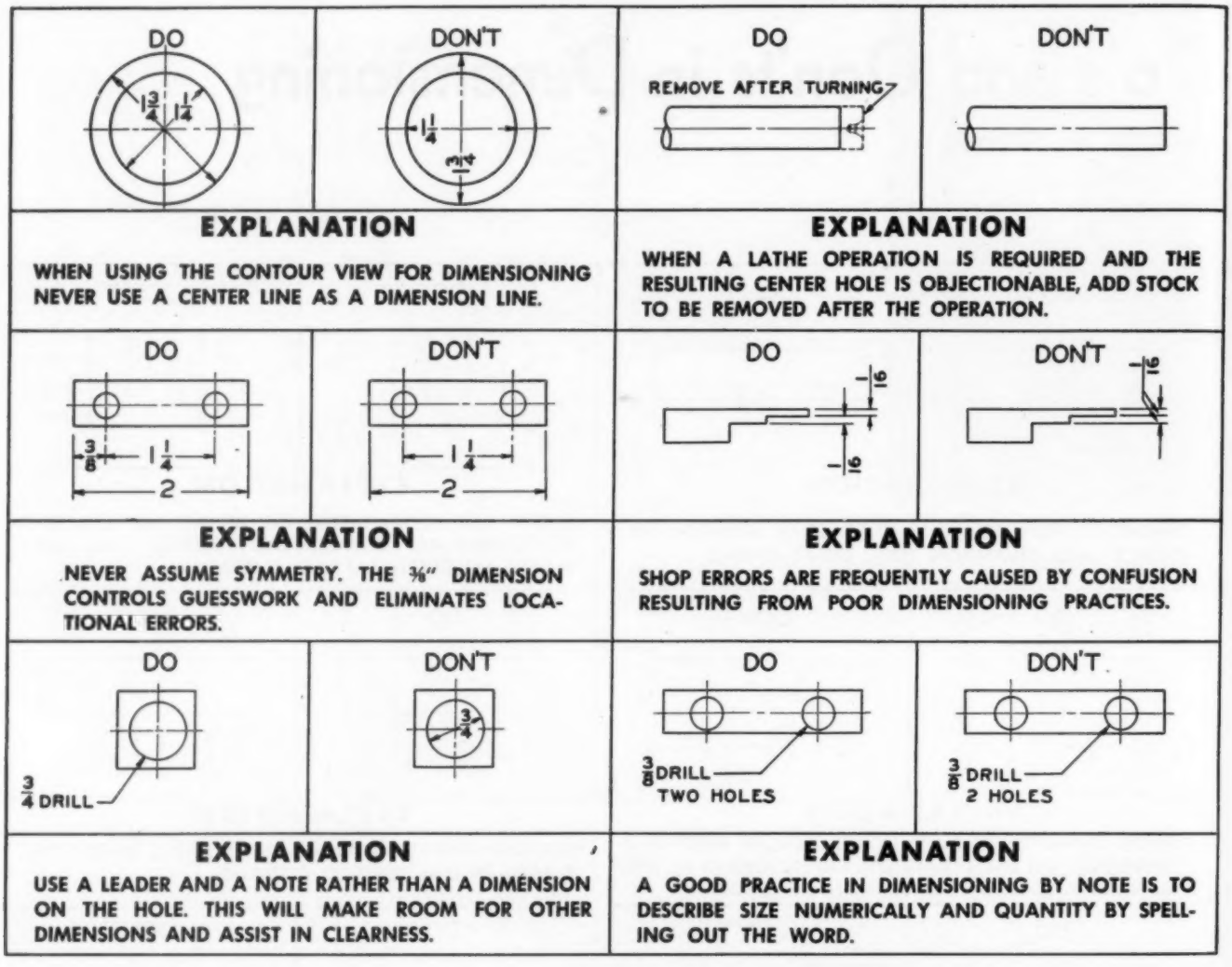
DO




DON'T

**EXPLANATION**

WHENEVER THE DIMENSION IS ¼" OR LESS, DRAW DIMENSION LINES OUTSIDE THE EXTENSION LINES.


DO
DON'T
EXPLANATION
WHEN USING THE CONTOUR VIEW FOR DIMENSIONING NEVER USE A CENTER LINE AS A DIMENSION LINE.
DO
REMOVE AFTER TURNING
DON'T
EXPLANATION
WHEN A LATHE OPERATION IS REQUIRED AND THE RESULTING CENTER HOLE IS OBJECTIONABLE, ADD STOCK TO BE REMOVED AFTER THE OPERATION.
DO
DON'T
EXPLANATION
NEVER ASSUME SYMMETRY. THE 3/8" DIMENSION CONTROLS GUESSWORK AND ELIMINATES LOCATIONAL ERRORS.
DO
DON'T
EXPLANATION
SHOP ERRORS ARE FREQUENTLY CAUSED BY CONFUSION RESULTING FROM POOR DIMENSIONING PRACTICES.
DO
3/4 DRILL
DON'T
EXPLANATION
USE A LEADER AND A NOTE RATHER THAN A DIMENSION ON THE HOLE. THIS WILL MAKE ROOM FOR OTHER DIMENSIONS AND ASSIST IN CLEARNESS.
DO
3/8 DRILL TWO HOLES
DON'T
3/8 DRILL 2 HOLES
EXPLANATION
A GOOD PRACTICE IN DIMENSIONING BY NOTE IS TO DESCRIBE SIZE NUMERICALLY AND QUANTITY BY SPELLING OUT THE WORD.

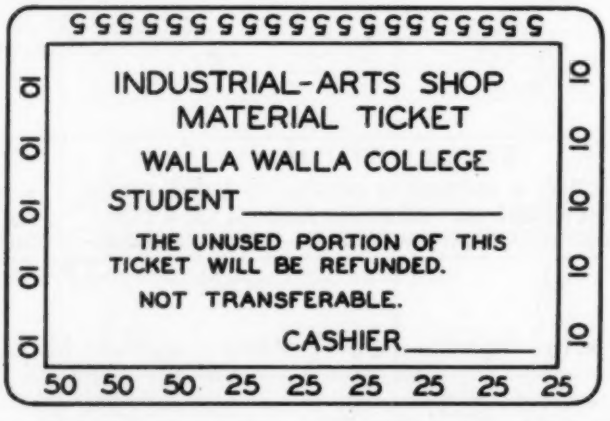
## THE MATERIAL TICKET AND SHOP SALES

**OSCAR H. LEE**
Department of Industrial Arts
Walla Walla College
College Place, Wash.

It is a recognized fact that shop teachers have more than enough to keep them busy and if there is a means of eliminating some of the detail it is usually welcomed with open arms.

The use of the material ticket is not new, but for the beginning teacher, or the experienced instructor searching for some way to cut administrative detail so as to have more time for individual instruction, this short discussion should prove to be valuable.

As a means of handling shop sales the material ticket is unsurpassed. The method is simple and free of complications. The student purchases from the business office one or more tickets the first day of shopwork.

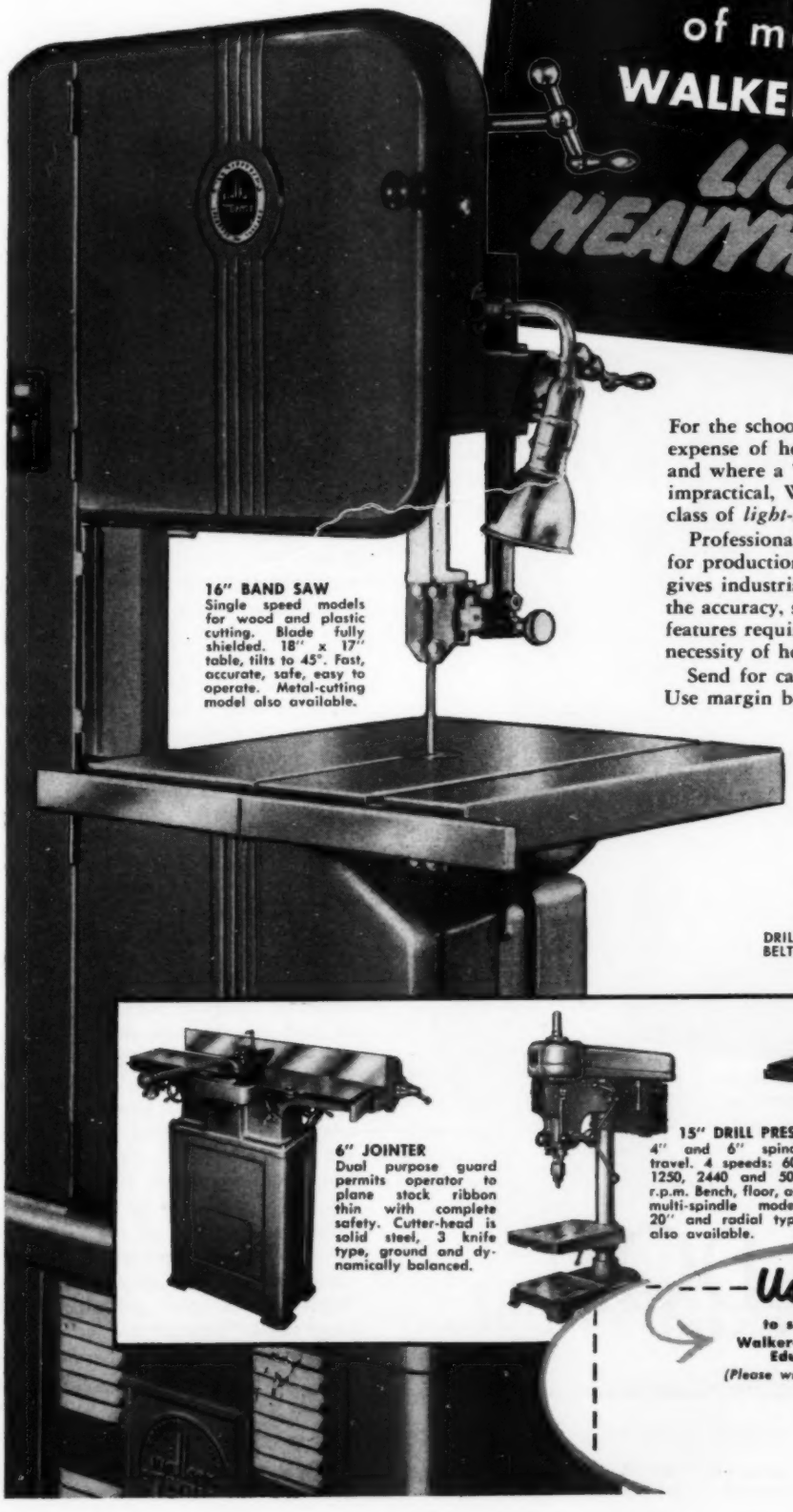



When his project plans are approved and he is ready to procure the necessary materials the instructor requests the student's material ticket. After the supplies have been issued, tallied, and the cost figured, the instructor punches the amount from the ticket and the transaction is completed. There is no need to go to the desk, find the student's account card, enter the type, quantity, and the cost of supplies, then later total the account and render a statement. Subsequent sales of supplies are handled in the same manner; simply issue the material asked for, punch the amount on the material ticket, and the work is done.

(Continued on page 20A)

# It's a whole new class of machines!

# WALKER-TURNER LIGHT-HEAVYWEIGHTS



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Single speed models for wood and plastic cutting. Blade fully shielded. 18" x 17" table, tilts to 45°. Fast, accurate, safe, easy to operate. Metal-cutting model also available.

For the school shop, where neither the capacity nor expense of heavy industrial machines is warranted, and where a "hobby power tool" would be as impractical, Walker-Turner has designed a special class of *light-heavyweight* machines.

Professional in design and operation, yet light for production machines, the Walker-Turner line gives industrial arts and vocational schools the accuracy, speed, ease of handling, and safety features required for student training, without the necessity of heavy investment.

Send for catalog describing complete line in detail. Use margin below to write your name and address.

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Dual purpose guard permits operator to plane stock ribbon thin with complete safety. Cutter-head is solid steel, 3 knife type, ground and dynamically balanced.



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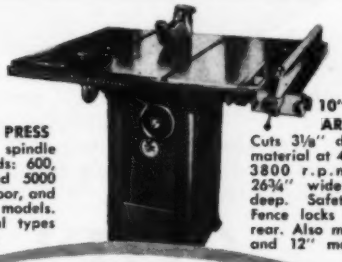

**10" TILTING ARBOR SAW**
Cuts 3⅛" deep. 2⅛" material at 45°. Speed: 3800 r.p.m. Table 26¾" wide x 32½" deep. Safety guard. Fence locks front and rear. Also made in 8" and 12" models.

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*(Please write your name and address in margin of page)*

## MATERIAL TICKET

(Continued from page 294)

If the balance on the student's ticket will not cover the cost of the requested supplies the student goes to the business office and purchases tickets to cover the cost.

The use of the material ticket is good education for the student, because it teaches him to pay cash for his supplies in place of putting off until a later date the settling of his accounts. Too often the accumulated bill is larger than he is able to handle and then a collection problem arises for the teacher. Also, if the student realizes the cost of his materials he will often reduce the size of his project, usually making several small ones rather than one large and expensive one. This will afford him more learning situations and therefore gives him a better education.

The accounting office is always assured that the salable supplies are paid for before the stock leaves the shop. When the tickets are purchased the amount is credited to shop supplies.

The ticket form here suggested is of the standard identification card size. It may be easily carried in the billfold. The cash value represented is five dollars, which is divided into convenient denominations.

To summarize: The advantages of the material ticket are as follows:

1. Cash is handled only by the business office.
2. Bookkeeping of student accounts is eliminated.
3. Material is paid for in advance.
4. There is no holding of projects until the material account is settled.
5. The same ticket may be used in more than one shop in the school.
6. It is a real timesaver.
7. More time is allowed for instruction.
8. Students are taught the value of the "pay as you go" method.
9. Learning situations are increased in many cases.

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from any angle.
(1) "Zero Precision" Tapered Roller Bearing—the best Timkens on any lathe. (2) Large collet capacity with choice of Center Distance. (3) Hobcut gears throughout for smooth operation. (4) Modern full double wall apron. (5) Bed has an engineered backbone. (6) Two V-belts to spindle for greater pulling power. (7) Holds precise accuracy for years.
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## METAL ENAMELING

**LOUISE SMITH**
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Springfield, Mo.

Metal enameling can be done successfully with a limited amount of equipment and a large amount of experimentation. Articles of jewelry such as earrings, lapel pins, belt links, necklace links, and hammered trays, can be decorated in pleasing colors, textures, and design. Crafts work is in great demand and metal enameling is no exception.

Enameling can be done on either gold, silver, or copper, but for practical purposes is generally done on number 18 gauge copper. Number 18 gauge copper has enough thickness and weight to fire and refire without burning.

Cut the metal into desired shapes with jeweler's saw or tin snips. File the edges smooth.

Anneal the metal, if it has not been, by heating to a red-hot heat. Oxidation will form on the surface of the metal but can be removed in a nitric acid bath of 9 parts of water to 1 part of nitric acid. One ounce of acid will be sufficient to clean many pieces of jewelry. Extreme care must be taken when mixing acid and water. Always pour the water in a glass or earthen container first, then the acid, so the acid mixture will not splatter. Place the metal in the acid bath and remove with copper tweezers, or bend copper wire to be used as tweezers. Tweezers made of steel will cause the acid solution to be ineffective on copper. After the metal has been removed from the acid bath, wash in water and wipe off with a paper towel. The metal may have some spots of oxidation left that can be removed faster with steel wool or emery cloth. The metal then is ready to be covered with enamel.

Enamel may be purchased from most pot-

(Continued on page 22A)

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Our strategically located warehouses and sales offices in the Middle West and East Central States and along the Eastern Seaboard can give you immediate quotations and more important, immediate deliveries. Get our bid on Sure Spec grades and you'll get quality steel, properly priced, expertly packaged to your exact specifications and delivered on time.

**Scrap Remnants Are Also Available at Special Low Prices**

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## METAL ENAMELING

(Continued from page 20A)

tery supply houses. Glass, such as found along streets, alleys, and vacant lots, may be crushed and used to add colors and textures to commercial enamels. Crushing can be done with a metal hammer on a hard surface, then ground with a pestle in a mortar. Some glass should be left coarse to give different textures.

Shortage of some equipment may require the substitution of other equipment, thus encouraging experimentation.

Scraps of small copper wire, silver wire, silver and copper filings, or copper screen wire may be used to add design and texture. The wire may be bent in abstract or concrete design, but however bent should lie flat on the surface of the enamel ware. The filings can be dusted on, after the surface has been covered with enamel. The screen wire is also placed on top of the enamel. However, the wire designs are placed on the copper and then the enamel filled around the wire.

Enamel comes in a dry powder and can be applied in three ways. It may be spread by dipping a wet water-color brush in the dry powder and then spreading on the copper. Water can be dropped on the copper to help make the enamel smooth. Enamel can be spread by wetting the powder with water to make a paste then spread with a spatula. Another way to apply enamel is by pouring or dusting on the dry enamel. A combination of all three methods would probably be the most satisfactory. Some companies recommend mixing their enamels with a gum in place of water.

Some suggest a thin base covering of enamel be fired before any design is worked out, while others just apply about 1/16 in. of enamel and consider that the final coat, if it comes out all right. Enamel on metal may be fired several times until the desired thickness or effect is obtained. If wire is to be used, bend it in shape and place on the ware, then fill in around the wire with enamel so the wire will be held securely but not covered. Metal filings and screen wire can be placed on just before the final firing. The enamel does not flow, so be sure every surface or edge is covered or, for the same reason, spaces may be left uncovered. If water is used to hold enamel in place, let the water dry before firing.

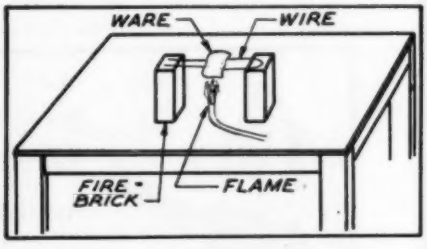


Fig. 1. Metal enameling

Firing can be done in a jewelry kiln, a small ceramic kiln, with a gasoline torch, alcohol torch, oxyacetylene, or any torch which can furnish heat up to 1600 deg. F. Enamel melts at temperatures from 1400 to 1600 deg. F. If a kiln is to be used, preheat to a higher temperature than 1600 deg. F., because several hundred degrees of temperature will escape when the door is opened. Lay the ware on a piece of firebrick, bisque pottery, or sheet iron and place in the kiln with long handled tongs or pliers. Leave in the kiln three minutes or until the enamel has melted. Let cool and place in a nitric acid bath to remove oxidation. Leave in bath until clean and wash with water. Enamel again if necessary and follow the same cleansing process. If firing with a torch, rig up a device such as that shown in Figure 1, so flame can be applied from underneath.

Apply the flame and watch carefully so flame can be removed when enamel has melted. The enamel has melted if it has changed colors and has had a glassy white

(Continued on page 25A)

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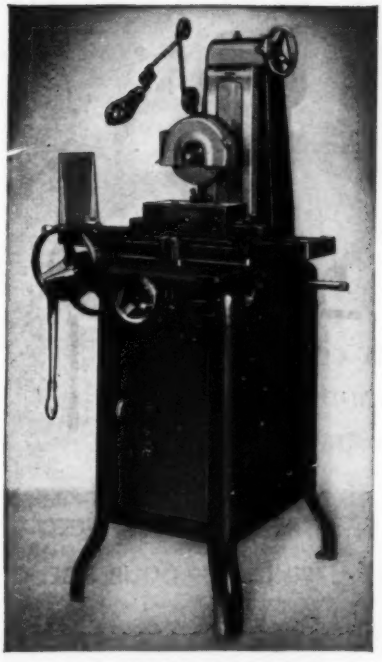
In shops where accurate, close tolerance work is necessary, skilled mechanics turn instinctively to Boyar-Schultz Grinders, knowing that these tools give fullest expression to their ability.

With Boyar-Schultz Grinders in your shop or tool room, you are sure you have the best your tool dollar can buy.

*Write for circulars.*



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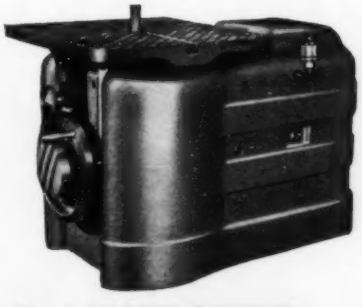

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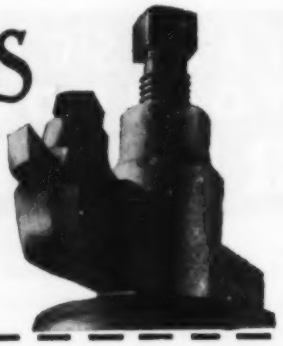

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CLEVELAND 4 OHIO

## METAL ENAMELING

(Continued from page 22A)

hot appearance; however, after firing a few pieces you will not have any doubt about when the enamel has melted. Let the ware cool, and apply more enamel if necessary. The enamel does not have to be cleaned before re-enameling if the new enamel does not touch the metal. After final enameling, place in the acid bath and wash in water.

The ware is now ready to have findings soldered on. Use soft solder or that which has a lower melting point than the enamel. If acid core solder is used, wash with soap, water, and brush, to remove any acid left from soldering. Another way to stop the action of acid is to immerse in a strong solution of baking soda in water.

Polish all exposed metal, on both sides, with fine steel wool or emery cloth and paint with clear nail polish or lacquer to prevent turning.

After simple enameling has been done, it is always interesting to work out new color combinations, how to get surfaces smooth, transparent and opaque finishes, different textures, and many other procedures.

Experimentation is the secret of success with this craft.

## SANTA BARBARA COLLEGE RECEIVES ROBERTS' LIBRARY

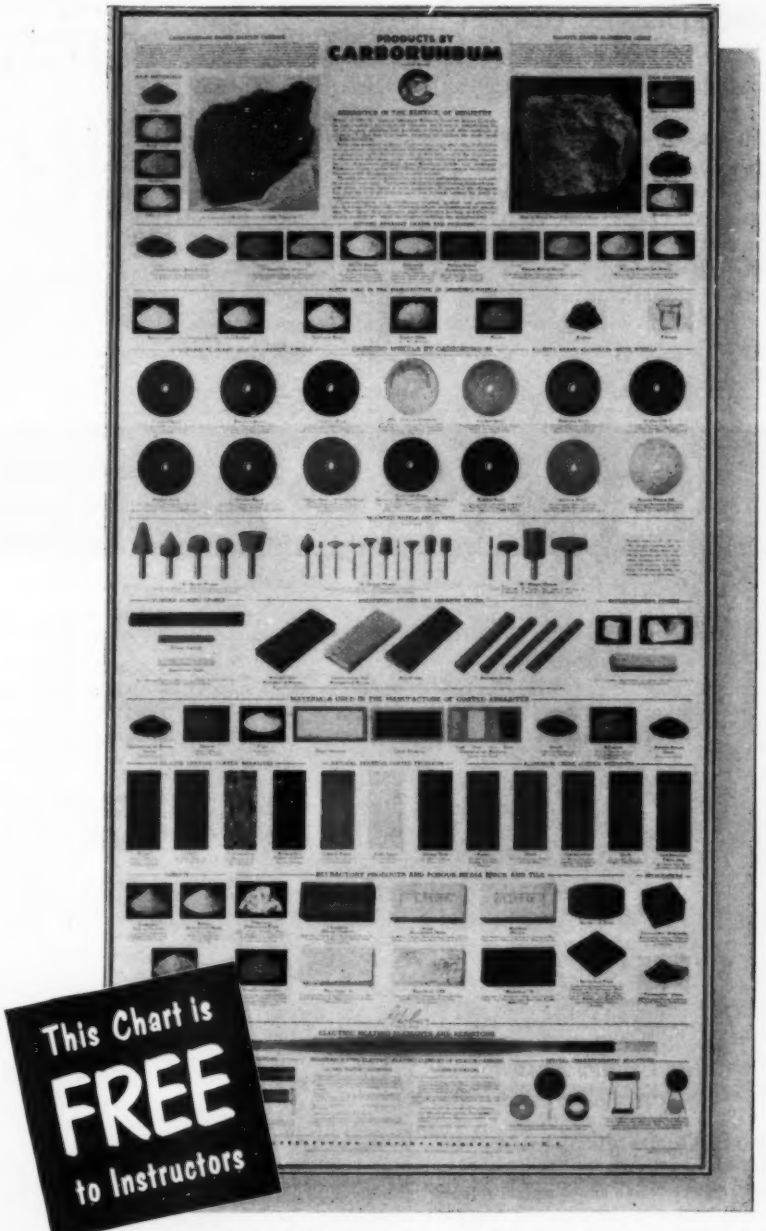
**E. E. ERICSON**
Professor of Industrial Arts
University of California
Santa Barbara College
Santa Barbara, Calif.

Students in the field of industrial arts will quickly recognize William E. Roberts* as one of the outstanding leaders in this field during its formative years. Mr. Roberts did his major educational work in Cleveland, Ohio, where he went in 1890 as principal of the newly built West Manual Training High School. In 1893 he became supervisor of manual training, a position which he maintained with some variation in titles until his retirement in 1933. At that time he moved to Dunedin, Fla., where he continued his lifelong interest in education and particularly in the work of his professional friends, until his death on August 28, 1950.

The extensive personal library accumulated through all those years by Mr. Roberts, according to his bequest, became the property of the University of California as an addition to the industrial-arts library. The collection is especially valuable because it contains many

*For a comprehensive biographical sketch of Mr. Roberts, see February and May, 1949, issues of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine.

(Continued on next page)

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## THE ROBERTS' LIBRARY

(Continued from previous page)

rare publications and documents telling the story of pioneering in thought and action by the small group of such men as Calvin Woodward, John D. Runkle, Gustaf Larson, Charles Richards, Frederick Bonser, Charles A. Bennett, Frank M. Leavitt and others, who successfully laid the foundation for our present day industrial arts and vocational education programs. Particularly valuable is the collection of printed proceedings of meetings of professional organizations and committees in this field and in education generally, recording as they do many papers and speeches bearing on philosophy and justification of the manual arts before the turn of the present century. These reports are augmented in the library collection by convention programs, personal correspondence, and unpublished reports.

As a supervisor and administrator for most of his professional lifetime, it is not surprising that Mr. Roberts should have collected a large number of curriculums and courses of study in the broad field of practical arts, as well as many copies of courses which show the progressive growth of the program in the city of Cleveland. Included here are preliminary reports of committees and other data showing step-by-step procedures as well as final results.

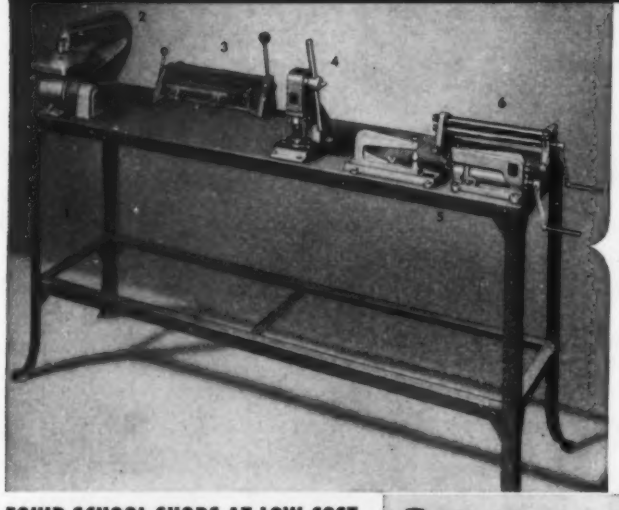
The collection also reflects the keen interest which Mr. Roberts had in teacher education and in the professional advancement of his own teaching staff, including as it does publications all the way from *Theory of Educational Sloyd* by Salomon and *The Manual Training School* by Woodward to the large number of books and pamphlets appearing after 1900. Many of these were, of course, of direct use to Mr. Roberts as summer faculty member upon repeated occasions in teacher training institutions.

Another way in which this library collection tells the story of the development of industrial arts is through the large number of project books and manuals issued progressively throughout the more than forty years during which the collection was made. These are especially valuable as furnishing a visual panorama of change and progress in the physical product resulting from industrial arts.

Not the least valuable aspect, particularly to the research worker in the field, will be the rich collection of government publications depicting and recording aspects of philosophy, methods and procedures, building plans and school organization, as well as legal enactments pertaining to the development of the various phases of the practical arts.

In all the Roberts' collection has been catalogued so far as containing 640 bound books; 306 bound periodicals; 31 folders of specially collected materials; 31 unbound periodicals; and 1500 pamphlets, folders, and unclassified pieces. The collection is now placed in the library of the department of industrial arts and is available to both departmental majors and other students of the college.


BERKROY SHEET METAL TOOLS



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For trimming, strip cutting, outside circle and contour cutting.

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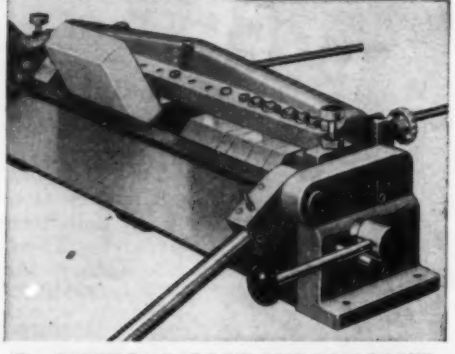

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Industrial Arts Department
Waverly High School
Waverly, Va.


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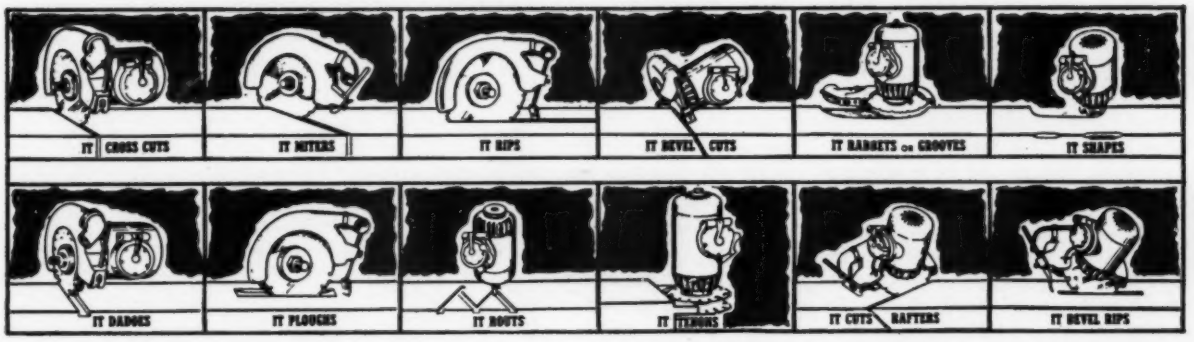
(Continued on page 28A)

# Now teach 12 operations with one LOW-cost unit!

**FASTEST...SAFEST...MOST ACCURATE**




More and more instructors are insisting on "De Walt" as basic equipment in their shops. They've found that men should be De Walt trained, as De Walt is in universal use.

As a power saw, it performs every machine cut possible. With a few inexpensive attachments, it becomes a jig saw, a lathe, a sander, a drill, even a metal cutter. It's the self same saw you'll find in plants, mills and shops all over the country.

But you've got to see De Walt in action to fully appreciate its amazing versatility. Ask your nearest De Walt dealer for a free showing of the 16mm sound film: "A complete Power Shop in One Machine." You'll see for yourself what a powerful teaching aid a De Walt can be.

AMF
DE WALT
POWER SAWS
DE WALT INC., Lancaster, Penna. · Subsidiary of
AMERICAN MACHINE AND FOUNDRY CO.
New York

## SAVING JUNK

(Continued from page 26A)

corner of the furnace room, or some other hidden corner. No matter how new and modern a building may be or how fine the "housekeeping" habits of all concerned, there usually is a junk pile to be found somewhere.

To the shop teachers, especially the teachers of a general shop, a junk pile can be of much practical use. At times certain hand tools need only a small part, a screw or small bolt to restore them to their usefulness, and perhaps for some reason you may need a V pulley for a machine. By having a junk pile to rummage through and by giving it a careful examination, you may find just the thing to make that needed repair.

By way of example, may I mention a few additions and changes we have made by reworking old machines and pieces of junk. An old cast iron water fountain base, 12 in. high, was converted into a stand for a tool grinder. By welding two vertical braces of 3/16 by 1½-in. strap iron to the foot of the fountain base and joining the upper ends of the two pieces with two pieces of 3/16 by 1½ by 1½-in. angle iron, placed horizontally, a solid and neat looking framework for the grinder stand was obtained. One piece of hard maple, ¾ by 11 by 14 in., was fastened to the angle iron with ¼-in. f.h. stove bolts. Upon this was mounted the motor grinder.

Three-eighth-inch holes were drilled equidistant around the base for lag screws with which the stand was mounted on an auxiliary bench. Two coats of green enamel over an undercoater were applied as a finish. In making this we not only utilized a piece of useless junk by converting it into a practical and good-looking piece of shop equipment, but also made space available for another wood turning lathe which was also rebuilt from one discarded years ago.

Some shop teachers who may be fortunate enough to replace all wornout machines with new ones, whenever they are needed, may frown upon and even question this method of saving used parts. However, these school-built machines and pieces of extra equipment which my students and I have built and rebuilt, are operating efficiently and doing a nice piece of work. Of course, these are not at all to be compared with the fine equipment obtained from Oliver, Delta, J. D. Wallace, or Walker-Turner, but the point is that they are serving the needs of the students and the instructor until they can be replaced with new and better ones. The old junk, therefore, is no longer useless junk.

Then, too, the junk pile presents a fine opportunity to teach students how to build their own inexpensive but efficient power tools for their home shops and to encourage still further home workshops for leisure and profit.

The wood-turning lathe mentioned in the foregoing was made from parts of another lathe which had been junked years ago. Headstock and tailstock spindles were put on and an extension was welded to the bed and the ways were ground true. The only new parts purchased were two grease-sealed ball bearings and one four-step, cone V pulley for the headstock spindle. The headstock spindle was machined from a piece of ¾-in. c.r. stock and the bearings were set in place with a press fit. One end of the spindle was machined to take the spur center; the other turned to ⅝-in. diameter for the pulley.

The tailstock spindle was made of the same stock as the headstock spindle, but it was threaded to take the ¾-in. hexagon nuts for locking. One end was machined to fit the tailstock cup center. Four pieces of angle iron, 1½ by 1½ by 3/16 in., were used for lengthening the bed. Two pieces were welded edge to edge on one face side and then butted end to end to the original bed and welded in place. The outer or tailstock end of the bed was closed with a brace block and the two legs of the original bed. On searching further, a tool rest and tool-rest slide were found, and after drilling and tapping a few holes they were made to fit the height of head and tailstock

(Continued on page 30A)

20" TILTING TABLE JIG SAW
TABLE SIZE SPINDLE SHAPER
20" TABLE SIZE SABER SAW
12" DRILL PRESS
BELT AND DISC SANDER
10" SWING WOOD TURNING LATHE
12" TILTING TABLE BAND SAW
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SHOPMASTER TOOLS MEET DEMANDS OF ALL SCHOOLS
Shopmaster Woodworking Tools are today's best school shop buys! They're priced as low or lower than any on the market . . . yet give you more outstanding precision features (many of them Shopmaster exclusives) for a lifetime of accurate, dependable shop service. You'll appreciate their extra heavy, rugged construction, fine precision bearings, simplified operation and exceptional versatility. The engineered simplicity of Shopmaster Tools enables students to learn quickly . . . and gives them a broader understanding of basic machining principles. When you make up your equipment requisitions this year . . . keep low cost Shopmaster recognized quality tools in mind.
MASSIVE CAST CONSTRUCTION
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NEW MITRE GAUGE STOP ROD INCLUDED
SEALED FOR LIFE BALL BEARINGS
SHOPMASTER
8" TILTING ARBOR SAW
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Slightly lower Zone 1

# They can't afford projector trouble at North Fork!

Mr. J. A. Thomason (L) and Mr. Norman Gould with the Kodascope Pageant Sound Projector used in North Fork (Calif.) Union Elementary School.

Over 250 students attend this school and one third of the group is comprised of Mono Indians. Many students have been trained as projectionists.

Because of its remote location, the school district at North Fork, California, can't risk a sound projector breakdown. The district covers a half million acres in the Sierra Nevada Mountains and, although Fresno is only 45 miles away, many of these miles are vertical.

To the people of North Fork, sound movies mean a lot more than an Audio-Visual teaching aid. They are a source of community education and entertainment. They are used by the Boy Scouts, Brownies, 4H Club, and other community groups.

Mr. J. A. Thomason, the District Superintendent and Principal, and his Audio-Visual Director, Mr. Norman Gould, chose a KODASCOPE PAGEANT SOUND PROJECTOR for these reasons:

1. The Pageant is portable, easily taken from place to place.
2. The Pageant is sturdy, withstands heavy use.
3. The Pageant is easy to operate *and requires no lubrication.*
4. The optical system always projects a sharp, clear picture—corner to corner.
5. The sound system provides faithful reproduction from all types of sound film.
6. The Pageant is priced to fit the most modest school budget.

And how did North Fork's Pageant measure up? *After more than 18 months of almost constant use, its PAGEANT SOUND PROJECTOR has never lost an hour from mechanical, electronic, or optical breakdown!* In your school, as at North Fork, the Pageant will prove a useful and dependable teaching aid.

The Pageant and speaker, in a single, portable case, weigh only 33 lbs. . . . list at $400. In a two-case, 4-speaker unit, $492.50. Why not let your Kodak Audio-Visual Dealer demonstrate the Pageant for you —or write us for new free booklet.

*Prices subject to change without notice.*

**MOTION PICTURES**

**...teach, train, entertain**

193

**EASTMAN KODAK COMPANY, Rochester 4, N. Y.**

**Please send me your booklet on the Kodascope Pageant Sound Projector.**

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STREET_____

CITY_____ ZONE_____

STATE_____

Kodak

## SAVING JUNK

(Continued from page 28A)

centers and the ways. After finishing with green enamel and mounting on a suitable stand, we had another valuable addition for our shop.

A number of my students in the machine woodworking classes are quite enthusiastic concerning wood turning. This second wood lathe is getting as much use as our first lathe had been getting.

A number of special tool and machine jobs can be undertaken by making various new and different jigs and setups. If you have an idea, give it time and thought, concentrate upon it, and develop it. Nine chances in ten the job can be made with material from the old junk pile. A jig need not be 100 per cent original, but with your ideas developed and projected into it, you may surprise yourself with what can be done.

As an example, if you do not have a disk sander, you need not go without one if you have a circular table saw. Cut a circular disk from a sheet of ⅛ or 3/16-in. boiler plate, or use any suitable sheet metal of heavy gauge and machine the edge true and smooth until you have a disk of a diameter equal to that of your saw blades. Locate the center carefully, and drill the center hole the same size as the saw arbor. Cut sandpaper disks to fit and cement to the metal disk. Emery paper or cloth may be used, but garnet papers or cloth stick easily and wear just as long and are preferred for good sanding. One side of the disk may be used for medium grit paper and the other side for a finer grit. The disk is then mounted on the saw arbor the same as a saw blade, and the miter gauge on the saw table will permit sanding accurately square edges and angles.

If you happen to have a spare ⅓-h.p., or ½-h.p. motor around, there is another type disk sander that can easily and quickly be made. Mount a piece of ½- or 3/8-in. plyboard to one side of a 12-in. V pulley. Cut a disk of the same diameter from heavy gauge aluminum, and fasten both plyboard and metal disk to V pulley with flathead machine screws — heads countersunk into the soft metal. Mount the completed disk on the motor shaft and then place the machine at one end of some workbench with the disk overhanging the edge of the bench. Care must be taken to true the edge of the disk with a sharp skew or diamond point chisel while the motor is running. This heavy disk can be balanced by addition of lead washers to the ends of the machine screws where needed. A small table or bracket arrangement can be made which will carry a miter gauge for sanding.

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. . . are possible with G-E Rectifier Transformers, from 1 to 700 volts, when using buck-boost connections. Specially designed for industrial electronics experiments, complete internal wiring diagrams and polarities are shown on the nameplate. 0.4-kva windings provide sufficient capacity for most educational purposes. Write for bulletin GEC-776 to General Electric Co., Sect. 687-96, Schenectady, N. Y.
GENERAL ELECTRIC

## CARE OF SHELLAC AND LACQUER BRUSHES

**OSCAR H. LEE**
Department of Industrial Arts
Walla Walla College
College Place, Wash.

The care of brushes is an important item if one wants to do good finishing.

Shellac and lacquer brushes are more easily cared for than almost any other type of brush. Shellac is a spirit varnish and as such dries by evaporation of the thinner, which in this case is also the vehicle. Lacquer also dries by evaporation. Shellac brushes are cleaned in alcohol, the thinner for shellac. Lacquer brushes are cleaned in a lacquer thinner.

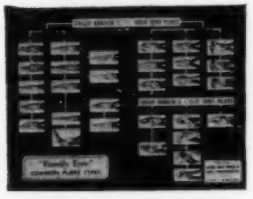
To keep these brushes in tiptop shape, ready to use at all times, and without cans of solution standing around in the shop, it is necessary only to follow the directions given below.

1. After the shellac or lacquer has been applied, wash the brush in its specific thinner so that about 90 per cent of the material is washed out.

2. Squeeze the excess liquid from the

(Continued on page 33A)

**A "FAMILY TREE OF COMMON PLIERS TYPES"**



**Wall Chart**

A pictorial chart that is self-explanatory to students — giving a clear, basic knowledge of major pliers and their variations. An invaluable aid for instruction use. (21" x 10" in two colors.)

**B "HOW TO USE PLIERS"** **Wall Chart**

The basic information contained in this wall chart is very helpful to the user of pliers. It shows the proper way to hold pliers, which size and shape pliers to use for your specific purpose — and other interesting features. Saves instruction time; is easy to use. (32" x 12" in two colors.)

**C "WHY DROP FORGED TOOLS LAST LONGER" — Wall Chart**

This chart illustrates how drop forging and induction hardening make pliers, adjustable wrenches and other tools more serviceable. It's good background for every user of hand tools. (32" x 12" in two colors.)

**D "PLIERS AND ADJUSTABLE WRENCHES"**

**Comparative Chart**

This chart is designed as an aid in comparing the tool numbers of pliers and adjustable wrenches of various manufacturers. Users can easily keep it current on this basic framework. Interesting, informative, and easily displayed.

**E "FIRST AID FOR PLIERS"**

**Booklet**

Eight pages on the care and repair of pliers — citing the five most common "pliers ailments" and complete description of how these can be remedied. (2 colors.)

**F "FIRST AID FOR ADJUSTABLE WRENCHES"**

**Booklet**

Four pages on the care and repair of adjustable wrenches. This booklet lists points which require "first aid" and prescribes simple treatments. (2 colors.)

**G "FOR ADJUSTABLE WRENCHES"**

**Pamphlet**

A further description of Utica's "induction hardening process" as applied to wrenches and its importance in preventing burring and nicking.

**H "MOST POPULAR TOOLS"**

**Pamphlet**

Shows the 16 most popular Utica tools with the most important uses and capabilities of each. Pictures and sizes available are included.

**I AVAILABLE UTICA MOVIES—**

**"Add Power to Your Hands"**

*(The rolling, forging, machining and heat treating of steel in the manufacture of modern hand tools.)*

**"Pliers: Their Use and Care"**

*(each 10 minutes, black and white, 16 mm., sound)*

The value of movies as training aids has long since been established and Utica makes these excellent films available to you on a loan basis. You pay return postage, only.

**J "UTICA MOVIES"**

**Folder**

A descriptive folder on the films mentioned in paragraph I. Get this folder if you'd like further information.

**K "TOOL USER'S GUIDE"**

**Complete Kit**

This kit contains all mentioned aids except the movies themselves. If you wish to send for all data as one package, check "Tool User's Guide" in the coupon.

# EDUCATIONAL AIDS OFFERED BY UTICA DROP FORGE

Good tools are at their best when properly used. Utica Drop Forge & Tool Corporation, manufacturer of pliers and wrenches, has developed an impressive series of teaching aids helpful in school or industrial shop teaching. To get them, use the coupon at right; they'll be sent promptly and without charge.*

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Inferior hand tools waste time, energy and make demonstration of a problem difficult, sometimes impossible. Good tools will help solve your problem of teaching your students how to do a job thoroughly and properly. Your specifying UTICA TOOLS® will preacquaint them with quality tools that they can expect to use in industry.

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- ☐ B. "HOW TO USE PLIERS"
- ☐ C. "WHY DROP FORGED TOOLS LAST LONGER"
- ☐ D. "PLIERS & ADJUSTABLE WRENCHES"
- ☐ E. "FIRST AID FOR PLIERS"
- ☐ F. "FIRST AID FOR ADJUSTABLE WRENCHES"
- ☐ G. "FOR ADJUSTABLE WRENCHES"
- ☐ H. "MOST POPULAR TOOLS"

I. MOVIES:

- ☐ "ADD POWER TO YOUR HANDS" Approximate date of use_____
- ☐ "PLIERS: THEIR USE AND CARE" Approximate date of use_____
- ☐ J. "UTICA MOVIES" (folder)
- ☐ K. "TOOL USER'S GUIDE"

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## with a STANLEY 61 Dovetail Attachment

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The 61 Dovetail Attachment handles boards to 12" wide, 3/8" to 1" thick. See your Dealer or write for literature. Use the coupon below.

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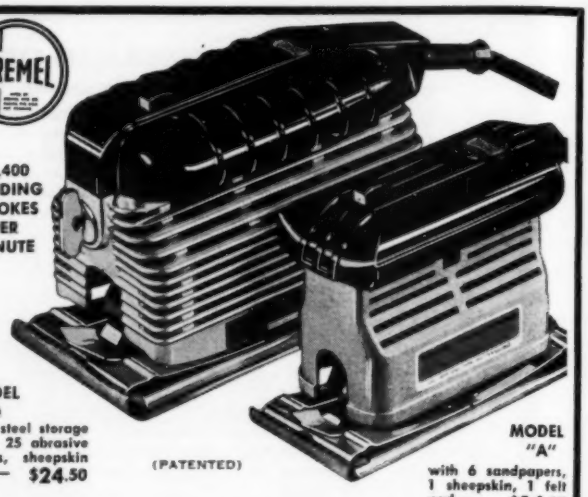

14,400 SANDING STROKES PER MINUTE

MODEL 2000 with steel storage case, 25 abrasive sheets, sheepskin pad — $24.50

(PATENTED)

MODEL "A" with 6 sandpapers, 1 sheepskin, 1 felt pad — $14.85

## FOR FASTER, SCRATCH-FREE SANDING... USE DREMEL STRAIGHT-LINE ACTION SANDERS

● Both of these Dremel *straight-line* action sanders are ruggedly constructed — ideal for student use — Model 2000 for any type woodworking assignment, including desk refinishing, general school maintenance — Model "A" for lighter projects. Each model has only 2 moving parts — requires no oiling or attention — uses 110-120 V., 60 cycle A.C. Model 2000 has 21 sq. in. sanding surface, weighs 5 lbs. Model "A" has 12 sq. in. sanding surface, weighs 2½ lbs. *Both are excellent polishers.* Dremel Sanders are precision tools widely used in schools, home workshops, and industry. Fully guaranteed. *If your dealer can't supply, order direct.* WRITE FOR COMPLETE TOOL CATALOG.

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# "OLIVER"

*Oilstone*

## Tool Grinders

***Show your students that good work calls for sharp tools***

It's a simple matter for students to keep their plane bits, chisels, gouges, knives, etc., sharp on an "Oliver." Each of the two Tool Grinders shown has one coarse and one fine revolving oilstone, a dry emery wheel with tool rest and adjustable tilting tool rest table fitted with tool holder for parallel grinding. The sturdier lower machine also has emery cone and leather stropping wheel.

*Write for Illustrated Bulletins Nos. 384 and 585*

OLIVER MACHINERY CO., GRAND RAPIDS 2, MICH.

## SHELLAC AND LACQUER BRUSHES

(Continued from page 30A)

brush by drawing it between the thumb and forefinger.

3. Shape the brush into a smooth, flat, chisel shape. Lay flat in a drawer or on the shelf, covered by paper to keep the dust off, and allow the brush to dry.

4. When the brush is needed again, place the brush in a small quantity of its specific thinner while the article is being dusted and wiped off with a tack rag. By the time the article is ready for the application of the finish material, the brush is soft and ready for use.

5. CAUTION — Do not yield to the urge to flex the bristles of the dry, stiff brush. To do so would cause some of the bristles to break.

Shellac and lacquer brushes cared for in this manner have been in constant use in the writer's shop for the past five years and are still in excellent shape.

## INCENSE CEDAR TOPS IN DECAY RESISTANCE

Incense cedar lumber, found in the forests of California, southern Oregon, and western Nevada, is one of the most durable and decay-resistant of native American woods.

The Forest Products Laboratory classes it with woods which hold paint longest and suffer least when protection against weathering is inadequate. Second only to decay resistance is its high dimensional stability. Volumetric shrinkage when dried from a green state down to 12–15 per cent moisture content is only 3.8 per cent — close to the bottom of the 3.4–6.3 range of commercially important softwoods.

Incense cedar wood is nonresinous. The sapwood is white or cream-colored and heartwood is light brown or light reddish brown. Annual rings are moderately distinct and average from 20 to 30 per cent. Texture is fine and uniform with small, evenly arranged cells. The wood has a spicy odor characteristic of all the cedars and weighs 24 pounds per cubic foot at 12 per cent moisture content, making it one of the lightest of all softwoods. Specific gravity is .37.

With a very low "K" factor (thermal conductivity in British thermal units per hour), incense cedar is one of the finest wood insulators. It is rated in the topmost of three groups in workability with hand tools and machines smoothly and easily to even, satiny surfaces. It glues easily under virtually all gluing conditions, a property which fits it to pencil manufacture into which a substantial portion of the annual production goes.

(Continued on next page)

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keeps you on the safe side
WILLSON SAFETY EQUIPMENT
Like these sturdy welding goggles, all Willson safety equipment is made after careful study of industry's needs. Through this continuing research you get many comfort and safety improvements first in Willson products. Ask for Willson—largest line of goggles and helmets for gas and arc welding.
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Adjustable leather nose bridge for extra comfort. Ample room for prescription glasses.
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Weld lens lifts up to leave clear Super-Tough® lens in place for chipping and inspection.
FLIP-FRONT HELMET No. 605
One-piece durable fibre shell with lift-up outer lens for quick inspection of work.

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**WILLSON PRODUCTS, Inc., 236 Washington St., Reading, Pennsylvania**

*Train your men with the best! specify*

**MORGAN VISES**

*for Woodworking*

**Morgan Junior Woodworker's Vise, featuring**

- *Solid nut*
- *Continuous screw*
- *Stop in front jaw*
- *Semi-steelcastings for durability*
- *Fully machined for accuracy and control*
- *7" to 10" jaw width*

**Morgan Quick-Action Woodworker's Vise, featuring**

- *Simplest and most effective of screw adjusting types*
- *Toles Pattern*
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- *Plain jaw or stop in front jaw*
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- *7" to 10" jaw width*

*Write for literature and prices*

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**120 N. Jefferson St. Chicago 6, Ill.**

## INCENSE CEDAR

(Continued from previous page)

Incense cedar trees average 20 to 30 in. in diameter and grow to heights from 75 to 110 feet, although unusual specimens are sometimes found up to 150 ft. high and 6 ft. in diameter. They grow intermingled with ponderosa pine, sugar pine, douglas fir, and white fir. Incense cedar is manufactured into lumber, pencil stock, and posts. The lumber is used for a variety of building purposes such as framing and finish and for fencing, Venetian blinds, toy stock, and many specialty products. Its decay resistance, light weight, and easy workability adapt it ideally to siding; much of it is manufactured into log cabin siding. High insulation value and ready nailability suit it to sheathing and subflooring. Incense cedar is also produced in dimension lumber for studding, plates, fire stops, and the like.

Incense cedar is graded under current published grading rules of the Western Pine Association. — *Western Pine Association Information Service.*

## PERSONAL NEWS

(Continued from page 8A)

♦ CHARLES LAMB, instructor in industrial arts at the Southeast Missouri State College, Cape Girardeau, Mo., has retired after 56 years of teaching to his credit. Forty-eight of these years were spent at the above school.

♦ GEORGE P. REARS, JR., Newark, N. J., has been elected president of the New York University Epsilon chapter of Tau Beta Pi, national honorary engineering fraternity, for the year 1952–53.

Other officers elected are: vice-president, Manfred Fenger; recording secretary, Robert MacLennan; corresponding secretary, Stanley Albrecht; and cataloguer, Robert Hansen.

♦ DAVID B. PORTER, acting chairman of the Department of Industrial and Management Engineering at the New York University College of Engineering, spent some weeks in Germany and Norway, participating in additional training programs on "Directed Energy," a democratic form of management developed in the United States.

Professor Porter and a team of experts spent a month earlier this year holding sessions in Berlin, Wuppertal, and Hanover.

This co-operative work between U. S. and German management leaders rests primarily upon a foundation of improved human relations.

The first directed energy programs were held in Norway and Germany during the summer of 1951 under contracts between the governments of those countries and the Jerome Barnum Associates firm of the United States.

Professor Porter has been on the staff at the New York University College of Engineering since 1923. He is well known as an authority on motion study, work simplification, and other methods of production control.

♦ E. W. TISCHENDORF has been appointed head of the industrial-arts department at Kent State University, Kent, Ohio. His appointment followed

(Continued on page 36A)

**SCHOOL SHOPS — the cradle of American Industrial Strength**

**Equip yours with Tech Books — Each a precision tool of training**

Never before has America made greater demands upon its reservoir of industrial man power. But as before, the training of this man power will be the responsibility of the nation's school shop teachers. As in the past, American Tech will co-operate with these instructors to provide the best in vocational and industrial training material. Typical of this material are these five books, ready to help today's trainees become tomorrow's skilled craftsmen.

**(1) SHEET METAL SHOP PRACTICE**
Teaches shop projects without recourse to drawn-out interest-killing theory. Starts right in with simple jobs and progresses into more complex projects.
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Projects in copper, brass, aluminum, sheet metal, pewter, and iron. Every project an Industrial Arts Award winner.
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Only modern text combining job lessons with complete instruction on welding, from fundamentals to advanced techniques.
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More than 400 illustrations in this book enabling beginning students to follow explanations of automotive theory without difficulty.
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A practical book suitable for those who merely wish to gain a working knowledge of drawing, as well as for those who plan to continue into advanced drawing.
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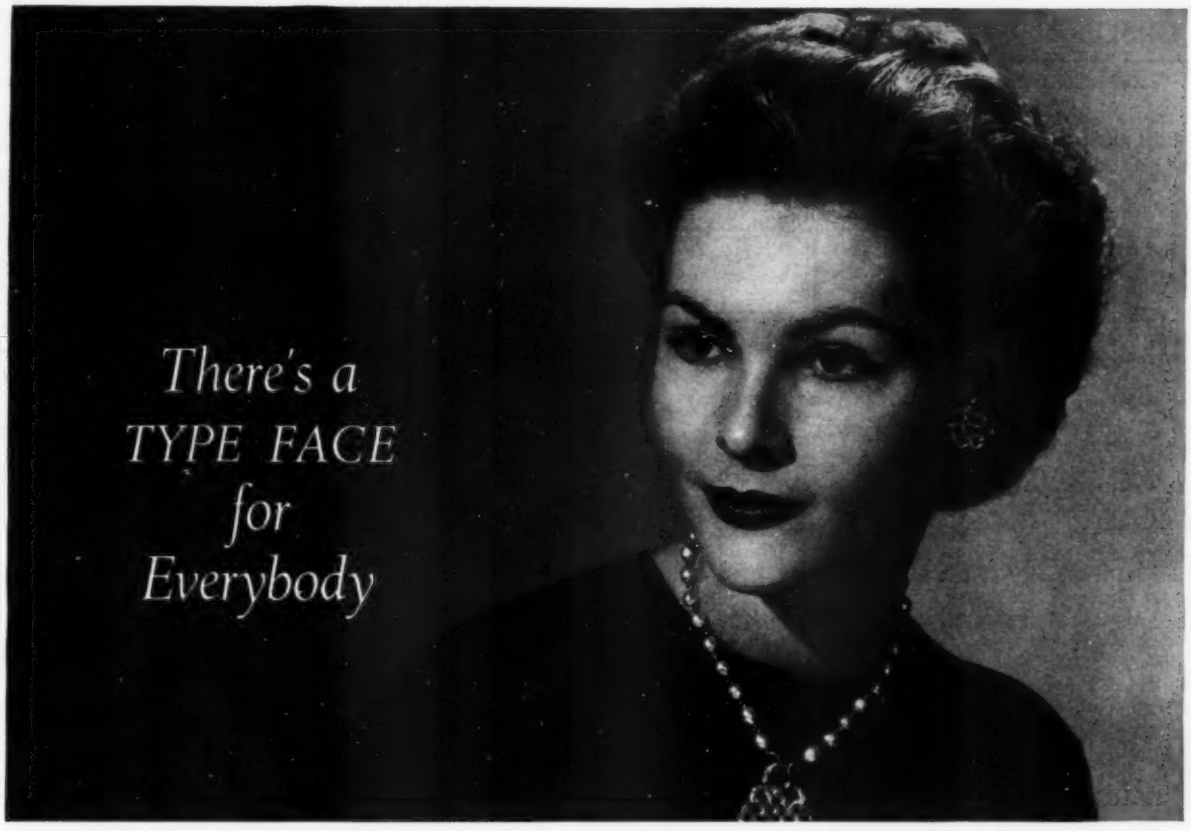


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☆ De Roos Specimen Booklet now ready; also folder demonstrating use of this face in various situations. For free copies write our Advertising Department, Desk 25.

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200 ELMORA AVENUE, ELIZABETH, NEW JERSEY • BRANCHES IN PRINCIPAL CITIES

## PERSONAL NEWS

(Continued from page 34A)

the resignation of Dewey F. Barich, who is now manager of the industrial-arts awards program of the Ford Motor Company.

♦ CHARLES F. BAUDER, director of vocational education, Philadelphia; J. NORWOOD BAKER, principal of Dobbins Vocational Technical School, Philadelphia; and BEN F. SLINGLUFF, special assistant in the Division of Vocational Education, Philadelphia; were honored at a testimonial dinner held on May 22, to mark their retirement from teaching in June.

The event was sponsored jointly by the Mechanic Art Teachers Association and the Philadelphia Vocational Teachers Association.

The men were presented with testimonial scrolls and engraved wrist watches.

Dr. Louis Nussbaum, retired associate superintendent of schools in charge of vocational education, made the principal address.

The affair was attended by 220 persons.

♦ Last spring at the annual meeting of the Industrial Arts and Trade and Industrial Education Section of the Tennessee Vocational Association, the group honored ED SMITH, the only vocational industrial education teacher in continuous service since the passage of the Smith-Hughes Act.

Mr. Smith was presented with a watch by W. A. Seeley, state supervisor of trade and industrial education. His confreres also treated him to a steak supper.

Mr. Smith began teaching in 1917 at the old Crockett Technical High School, which is now the board of education, and when Tech moved to its present site Mr. Smith went with it, and he has been there ever since.

♦ RUSSELL L. PACKARD, education director of Packard Motor Car Company, was awarded an honorary doctor of science degree by the Lawrence Institute of Technology, Detroit, Mich., at commencement exercises last June.

## *News Notes*

♦ Benjamin Putterman, president of Yankee Metal Products Corporation, has presented J. R. Kingman, Jr., director of the Dunwoody Industrial Institute with a check for the first Traffic Safety Scholarship to be sponsored by a manufacturer in the automotive safety accessory field. The winner will receive a year's free tuition at the famous Minneapolis Automotive School.

♦ The Elgin National Watch Company plants in Elgin, Ill., and Lincoln, Neb., arranged to have the local high school teachers and instructors from the University of Nebraska brought into the firm's plant as employees. The purpose of the plan was to show educators how an industry works, particularly from a local viewpoint.

The teachers involved expressed complete approval of the program and the desire that it be continued in the future.

♦ Awards of seven industrially sponsored scholarships to students at Illinois Institute of Technology were announced recently.

Four Chicago industries sponsored six of the scholarships, valued at $3,600.

Two civil engineering students received the annual $2,000 Ceco Steel Products engineering scholarship.

The Transparent Package scholarship, provides one-half tuition each for two chemistry students.

♦ State awards of the Fifth Annual National Driver Education Award Program for the 1951–52 school year will be based for the first time on the quality of the training in safe driving being given to high school students taking the courses, as well as the number of schools giving instruction and the total of pupils enrolled.

With all of the figures on school participation and enrollment in the 48 states and the District of Columbia now in hand, together with data on the quality of the instruction being given, the board of judges of the fifth program sponsored by the Association of Casualty and Surety Companies were to meet at the Hotel Statler in New York City on Wednesday, August 27, to choose the recipients of awards in three classes: (1) excellence, (2) honor, and (3) merit.

♦ You and Labor Law is a new color slide-film presentation which traces the development of federal labor legislation from its origins down through the Wagner Act, then takes up the present Taft-Hartley Act point by point. Produced by Transfilms, Inc., and distributed by Seminar Films, the series uses cartoons to draw the picture, and a commentary on 33⅓ r.p.m. records to spell out the essential facts in simple, effective language.

(Continued on page 38A)


# PAXTON LUMBER... *for your school shop*

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A shop for beginners . . . and one for advanced students. A shop for teaching lathe work . . . another for teaching drill press operation. A shop with circular saws to spare . . . a shop with enough disc sanders to meet the most abnormal demand.

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Key to the *Flexible Shop* is SHOPSMITH! This versatile power tool can be changed quickly and easily from an 8-inch circular saw to a 12-inch disc sander to a 33-inch lathe to a horizontal or a 15-inch vertical drill press. In a shop equipped with several SHOPSMITHS, there is virtually no limit to the power tool combinations it is possible to set up!

SHOPSMITH is a tool of exceptional quality and precision. In accuracy, capacity and all-around utility, it equals or surpasses the individual tools it replaces or supplements. In compactness and flexibility, it far exceeds all others. In safety and simplicity of operation, it has the approval of leading industrial arts instructors.

SHOPSMITH costs $189.50 complete except for ½-hp. motor ($34.50) and special school guards ($8.45). Send coupon for booklets describing completely SHOPSMITH's application to industrial arts education!

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• Please send me complete information about the *Flexible Shop* and the application of SHOPSMITH to industrial arts education.

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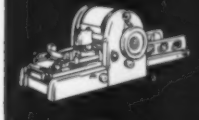

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## NEWS NOTES

(Continued from page 36A)

Each strip lasts 15 minutes and can be used separately or in one continuous session.

Part I tells why we have labor laws at all and shows how they evolved. Parts II and III explain each provision of the Taft-Hartley Act.

The whole series views labor regulations as they apply equally to employers and to unions.

For further information write to *Seminar Films, Inc., 347 Madison Ave., New York 17, N. Y.*

♦ The Executive Department Division of Safety, of the State of New York, have just published training materials of the State Fire Training Program consisting of: Workbook — Intermediate Course and Workbook — Advanced Course.

These are issued only to enrolled student firemen in the program by the County Fire Instructor.

The material was prepared by Leonard C. Silvern, training co-ordinator.

♦ Six new courses will be offered this fall by New York University's Center for Graphic Arts. The Center, part of the University's Division of General Education, now gives 24 courses intended for persons working in the graphic industries.

The new courses will be on advertising design, graphic design, styles and types of book illustrations, industrial design methods, and advertising psychology for the business executive.

♦ A new system for converting existing silent film into sound motion pictures was announced by the Bell & Howell Company. The new development permits the magnetic recording and playback of sound directly on standard silent film, perforated along both of its edges.

The silent film exposed in all types of 16mm. motion picture cameras (both magazine and roll film) also can be striped for magnetic sound. Previously only a limited number of cameras that would handle single perforated film could be used.

Units of the Company's magnetic recording projector now in the field can be factory adapted to the new system for a nominal charge.

♦ Two new filmstrips, *Exploring Electricity*, have been added to the shop film strip series published by The Chas. A. Bennett Co., Inc., Peoria, Ill.

Thus far, ten film strips have been published in the shop field. A set of four film strips on woodworking, a similar set of four strips for metalworkers, and this latest two-set series on electricity.

*Exploring Electricity* is based on the textbook, *Industrial-Arts Electricity* by Clifford K. Lush and Glenn E. Engle. This set is prepared to meet the needs of all courses in the fundamentals of electricity, such as industrial arts, introductory high school physics, or vocational classes.

These film strips are simply planned, thought-provoking, and priced at only $6.25 net. New "package" offers are available on the other film strips in the shop series. The woodworking series, includes Making a Project With Hand Tools, Woodworking Machines, Furniture Joinery, and Safety "Know-How." The metalworking series includes Laying Out, Cutting, Filing, and Drilling, Bending and "Beating Down" Metal, Raising and Surface Decoration, and Jointing and Finishing Art Metal.

For further information write to the address given above.

♦ The DoALL Training School in new and larger quarters at 254 N. Laurel Avenue, Des Plaines, Ill., provides basic training in technical selling to new Machine Tool and Cutting Tool Specialists of the growing coast-to-coast network of DoALL sales corporations. Customers' machine operators are also trained here in all phases of band machine and surface grinder operation.

♦ For a handy refresher of coated abrasive basic information write to *Behr-Manning, Troy, N. Y.*

♦ A new film on model railroading, *"Boys' Railroad Club,"* is available for free loan to schools, Boy Scout troops, YMCA's, boys' clubs, hobby groups, and other organizations, from Association Films, Inc., 347 Madison Ave., New York 17, N. Y. The 15-minute film tells about a boys' hobby club where the members operate their own model railroad system.

*"Boys' Railroad Club"* is a Transfilm production, sponsored by the A. S. Gilbert Company, manufacturers of American Flyer Trains. The film may be borrowed at no charge except transportation from Association Films: New York, 35 W. 45th Street; Chicago, 79 E. Adams Street; San Francisco, 351 Turk Street; and Dallas, 1915 Live Oak Street.

♦ The Columbian Vise & Mfg. Co., Cleveland 4, Ohio, recently offered to replace free any of its products damaged during the storm period in the tornado-stricken Mississippi Valley Area.

In a letter dated March 24, Columbian President H. F. Seymour wrote: "Newspaper accounts of your tornado indicate very real damage in your city. If by chance any Columbian Vises have been harmed by water, will you consider this your authority to return them, freight collect, for replacement by new vises. . . ."

♦ A. B. Dick Company, manufacturers of A. B. Dick mimeograph and lithograph products, has now entered into the spirit duplicating market with a complete line of spirit carbons, ready-to-use master sets, and miscellaneous spirit duplicating products.

The new A. B. Dick master sets and spirit carbons feature carbon deposits *locked in* beneath a protective metallic coating which covers the carbonized surface of the carbon sheets. A metallic coating is also used to seal the edges of the carbon sheets and insure clean handling.

A. B. Dick master sets and spirit carbons are offered in conventional purple and in brilliant colors — red, blue, green, and black.

This makes A. B. Dick impression papers available for mimeograph, spirit, and offset duplicating. *A. B. Dick Co., 5700 W. Touhy Ave., Chicago 31, Ill.*

♦ Six new full-color, full-length film strips important to agricultural students, farm groups, and future farmer organizations, have just been released in a group of three series entitled Selection of Breeding Stock by the Audio-Visual Division of Popular Science Publishing Company, 353 Fourth Avenue, New York 10, N. Y.

Fully covering beef, sheep, and swine, each of the three series consists of two natural-color film strips — one devoted to the male and the other to the female — that enables teachers and discussion leaders to bring into their classrooms hundreds of selected examples of animals that illustrate vital points of stock selection.

All frames were specially protographed at Oklahoma A. & M. College and at Purdue University, under guidance of Animal Husbandry experts of both institutions and of the United States Department of Agriculture.

The three series, Selection of Breeding Stock-Beef, Selection of Breeding Stock-Sheep, and

(Continued on page 40A)

# for schools genuine *Hide Glue* is the strongest known

now you can use it right out of the can!

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no heating
no waste
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**WILL NOT DULL TOOLS!**

Franklin hide glue never gets hard or brittle. It is resilient and tough like raw hide. It is easy to use and easy on tools.

**DOES NOT STAIN WOOD**

**MAKES JOINTS STRONGER THAN THE WOOD ITSELF**

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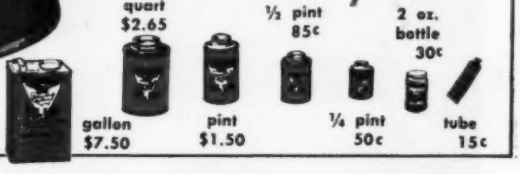


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SIX SIZES: 2 oz., ¼ pt., ½ pt., pint, quart, gallon

## *Get this tube Free!*

A generous size sample tube will be sent free if request is made on official school letterhead.

**THE FRANKLIN GLUE COMPANY**
131 W. Chestnut St. Columbus 15, Ohio

## NEWS NOTES

(Continued from page 38A)

Selection of Breeding Stock-Swine are each priced at $12, complete with two strips and fully illustrated Teaching Guide. For further information write to *Popular Science Publishing Co., 353 — 4th Ave., New York 10, N. Y.*

♦ A two-year curriculum in printing technology is now being offered by Western Michigan College, Kalamazoo, it is announced by Dr. J. W. Giachino, head of the vocational-industrial and technical education department of the college. Lawrence J. Brink, assistant professor of industrial education, is in charge of the program.

The curriculum is designed to serve students who wish to become supervisors or owners of plants, as well as those who wish to work in the industry. Practical experience is offered in hand composition, linotype operation, layout and design, platen and cylinder presswork and bindery operations. In addition, students pursue such related courses as vocational English, applied mathematics, pulp and paper technology, and various business courses.

For further information write to *Dr. J. W. Giachino, Western Michigan College of Education, Kalamazoo, Mich.*

♦ A national plan for integrating safety into school shop courses attended by thousands of students training for jobs in industry was announced by the Association of Casualty and Surety Companies, with publication of a new textbook, *Education for Safety Through the School Shop.*

The book provides a detailed outline for the safe use of the equipment and tools used in school shop courses. The text was prepared by the Center for Safety Education of New York University and the safety engineering specialists of the Association's accident prevention department, working under the guidance of an advisory committee of 16 leaders in industry, labor, and education.

Copies of the book, priced at $1.10, may be ordered through the Accident Prevention Department, *Association of Casualty and Surety Companies, 60 John St., New York 38, N. Y.*

♦ The Institute of Design of *Illinois Institute of Technology* announces a new graduate program leading to the degree of master of science in art education.

This program offers primary and secondary schools as well as college teachers the most advanced techniques for the training of students at all age levels in art and design.

The program follows the philosophy of the Institute of Design and its founder, the late Moholy-Nagy.

For further information address the Director, Institute of Design, 632 N. Dearborn St., Chicago, Ill.

♦ A limited number of copies of the summary of the fourth annual conference of industrial education, held on October 13, 1951, at the Pennsylvania State College, State College, Pa., are still available.

At this convention the place of industrial arts and vocational-industrial education in meeting the needs of the 60 per cent group were thoroughly discussed.

Copies may be obtained as long as the supply lasts, by writing to Dr. S. Lewis Land, head, department of industrial education at The Pennsylvania State College.

♦ Nearly 1,500,000 World War II veterans were training under the G.I. Bill at the close of 1951 — a drop of only 16 per cent below the 1,700,000 total of a year ago, a Veterans Administration survey disclosed.

The decline was appreciably less than that which occurred from 1949 to 1950. End-of-year enrollments in 1950 were 26 per cent under the 1949 figure of 2,300,000.

The peak of the huge veterans' training program came at the end of 1947, when more than 2,500,000 veterans were enrolled in schools, on-the-farm or on-the-job.

The December, 1951, enrollments included 400,000 veterans studying in colleges and universities; nearly 700,000 in schools below the college level, most of which were trade and vocational schools, 238,000 in on-the-farm training courses, and nearly 97,000 in on-the-job training.

♦ The Rockford Machine Tool Company celebrated its 50th year of existence on April 3, 1952. It was founded by the late Robert C. Lind, and a few of his associates. Until 1904 it was known as the National Engine Company. In that year it began manufacturing machine tools, and then changed its name to the Rockford Machine Tool Company.

To celebrate the Company's golden anniversary, several events have been planned, and carried out, including a Company Display during the months of April and May in the Gas & Electric Building in Rockford, Ill. Open house was held for employee's families, and friends, as

(Continued on page 42A)

**PARKS No. 20**
**20" PLANER**

**Here is a modernly designed, rugged, high-speed, low-priced planer that is ideally suited for every shop and industrial plant requiring a quality surfacer. The Parks No. 20 Planer has a four-knife cutterhead with a speed of 3600 R.P.M. and offers two feed speeds — 20 and 40 F.P.M., and 40 and 80 F.P.M. Write for complete descriptive literature.**

**The PARKS Heavy-Duty 12" x 4" Planer**

**A compact, sturdy, thickness planer that offers mill planer precision and ruggedness at a sensationally low price. Write for descriptive catalog sheet.**

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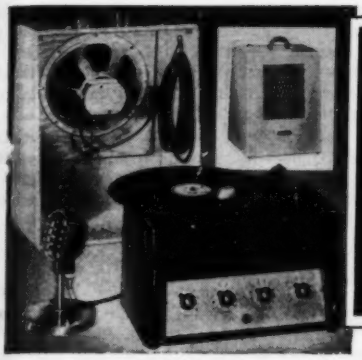

**20-WATT DELUXE PORTABLE PA SYSTEM**

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**$74.88**

COMPLETE, READY-TO-USE!

Custom-built to the rigid specs. of a merchandiser Nationally known for top quality at low prices for a feature value at $156.50 . . . our crazy Low Price belies the outstanding quality and DeLuxe features of this system. Believe Us . . . This is a Fantastic Bargain.

Ideal for Church and School Auditoriums, Theaters, etc. Easy to set up and take down, easy to carry . . . each a complete matched system. The two carrying cases are of sturdy plywood covered with attractive, durable Fabricoid. The backs serve as a baffle for the permanently mounted speakers, easy to hang or stand up where desired. Operate on 105-125 volts, 25-60 cycles AC. Approved by Underwriters Lab. Every One Brand New, Fully Guaranteed. **Consists of: 7 tube, 3 stage Amplifier** with Push-Pull 6L6G output tubes. Gives a wide range frequency response of 50-10,000 cycles with low distortion; very conservatively rated 20-watt output; 28-watt peak output. Has 2 mike and one phono input; separate mixing type volume controls for each mike and phono; fully variable tone control. Has 78 RPM Phono-motor top with lightweight crystal pick-up. Supplied with Electro-Voice Model 910—$28.50 List Value Crystal Mike with detachable desk stand and 20 ft. cable and connectors; Two Carrying cases as illustrated above with a 12" Heavy Duty Alnico V matching PM Speaker mounted within each case and 25 foot speaker cable with connectors. Amplifier size 14x8x8", fits inside speaker case for portability. Case sizes each 21x16x13".

**No. 39B16. Complete System as above** (Shpg. wt. 71 lbs.)..... **$74.88**

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JUST PUBLISHED . . . a truly modern textbook covering the latest developments, including power steering, automatic transmissions, etc. Specifically for the school shop . . . contains sections on safe driving, used car purchasing, etc. Everything for the beginner. By HAROLD T. GLENN. . . . $3.96 (5 or more, $2.97 each). No. 2 in Coupon.

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Nation-wide acceptance shows this textbook outstanding! Step-by-step procedures from cutting out rough stock to finishing the project. Covers fundamental processes, basic machine tools, wood and wood products . . . woodworking opportunities, "different" projects. By JOHN L. FEIRER. . . . $2.88 (5 or more, $2.16 each). No. 3 in Coupon.

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Tough, lasting fine cutting edges for all types of woodworking. Various types of socket butt and firmer chisels with "Hardwear" green plastic or hickory handles. Outside or inside bevel socket gouges. Short and full length turning tools.

**AUGER BITS, CAR BITS AND DRILLS**

There's a GREENLEE for every need . . . all types of twists and heads. Accurately sized, perfect cutting edges. Line includes the famous "Greenlee 22" Solid-Center Auger Bits which come to you "Plastic Sealed" for factory-sharp edges.

**EXPANSIVE BITS**

Fast, easy-boring Expansive Bits with free, positive chip clearance. Specially-designed wide, open throat assures smooth, uninterrupted action. In two styles — Setfast with quick adjusting-locking feature and Plain.

**SPIRAL SCREWDRIVERS AND AUTOMATIC PUSH DRILLS**

GREENLEE Spiral Screw Drivers are sturdily constructed and have special phosphor bronze drive nuts for long, hard service. Beautifully finished, three sizes. Automatic Push Drills have completely enclosed working parts and phosphor bronze drive nuts. Handle holds eight points. Chromium plated.

**The GREENLEE line also includes Bit Extensions, Razor-Blade Draw Knives, Ship Augers, Electricians' Bits, Hand Benders for Tubing, Radio Chassis Punches, Knockout Tools and many other timesaving tools for the shop worker and the student.**

TOOLS FOR CRAFTSMEN
GREENLEE

**Free Folder H-301 with complete data on GREENLEE hand tools for the woodworker. Write Greenlee Tool Co., Division of Greenlee Bros. & Co. 2030 Twelfth Street, Rockford, Illinois. U. S. A.**

## NEWS NOTES

(Continued from page 40A)

well as special days for dealers of the Company and their customers.

The company's address is *Rockford Machine Tool Co., Rockford, Ill.*

### "NOW WHERE DO WE GET APPRENTICES?"

A two-page review discussing in question and answer form the problem of obtaining an adequate number of apprentices to meet the quota needed to be trained to provide for the skilled man power required. The answers are presented by Robert T. Morrill, who has been chairman of the Apprenticeship Committee, National Association of Master Plumbers. The problems and answers are sufficiently comprehensive to be applicable in any building trade and also to a large extent in the metalworking trades.

Copies of this reprint can be obtained free of charge by writing to the *Bureau of Apprenticeship, U. S. Department of Labor, Washington 25, D. C.*

The average U. S. farmer today, with petroleum-powered equipment, has 33 horsepower at his command — six times the horsepower he had 30 years ago. — *Petroleum Newsnotes*, American Petroleum Institute, New York City.

## *New Publications*

### Essentials of Industrial Education

By Arthur B. Mays. Cloth, 248 pp., 6¼ by 9¼ in., $3.75. McGraw-Hill Book Co., Inc., New York City.

A college text for students of general education and industrial arts and vocational education.

The material is divided into 19 chapters which present historical data, discuss early and modern forms of apprenticeship, the role of skill in industrial education, full-time and part-time vocational schools, evening schools, home-study schools, training within industry, and training of industrial teachers.

The material in this book is largely based on what the author used in his own classes. That he has an excellent background for writing such a text is vouched for by the forty years which he has spent in educating teachers.

At the end of each of the chapters in the book will be found a number of questions and assignments, as well as a list of selected references.

### Elementary Metallurgy

By W. T. Frier. Cloth, 258 pp., 5¾ by 8¼ in., illus., $4.50. McGraw-Hill Book Co., Inc., New York, N. Y.

This second edition of this excellent text presents a complete revision of the earlier book.

Some of the older material has been rearranged into a more logical order and much new material has been added.

Questions for discussions and references for further study have been added at the end of each chapter.

The twelve chapters of the book present clearly expressed information about iron (cast and wrought), steel, constitution diagrams of alloys, heat treatment of steel, methods of forming metals, grain structure of metals, alloy steels, nonferrous alloys, and testing.

Motion pictures and film strips on this subject also are listed.

### How to Plan a House

By Gilbert Townsend and J. Ralph Dalzell. Cloth, 584 pp., 5⅞ by 8½ in., illus., $6.95. American Technical Society, Chicago, Ill.

This is the second edition of this interesting and helpful book.

The basic discussion of preplanning the proposed house is covered in the first four chapters of the book. After this work has been done, scaled replicas of the various pieces of furniture can be made and arranged on plans until room sizes and shapes have been established.

Out of these floor plans the elevations grow until the proposed house is actually down on paper.

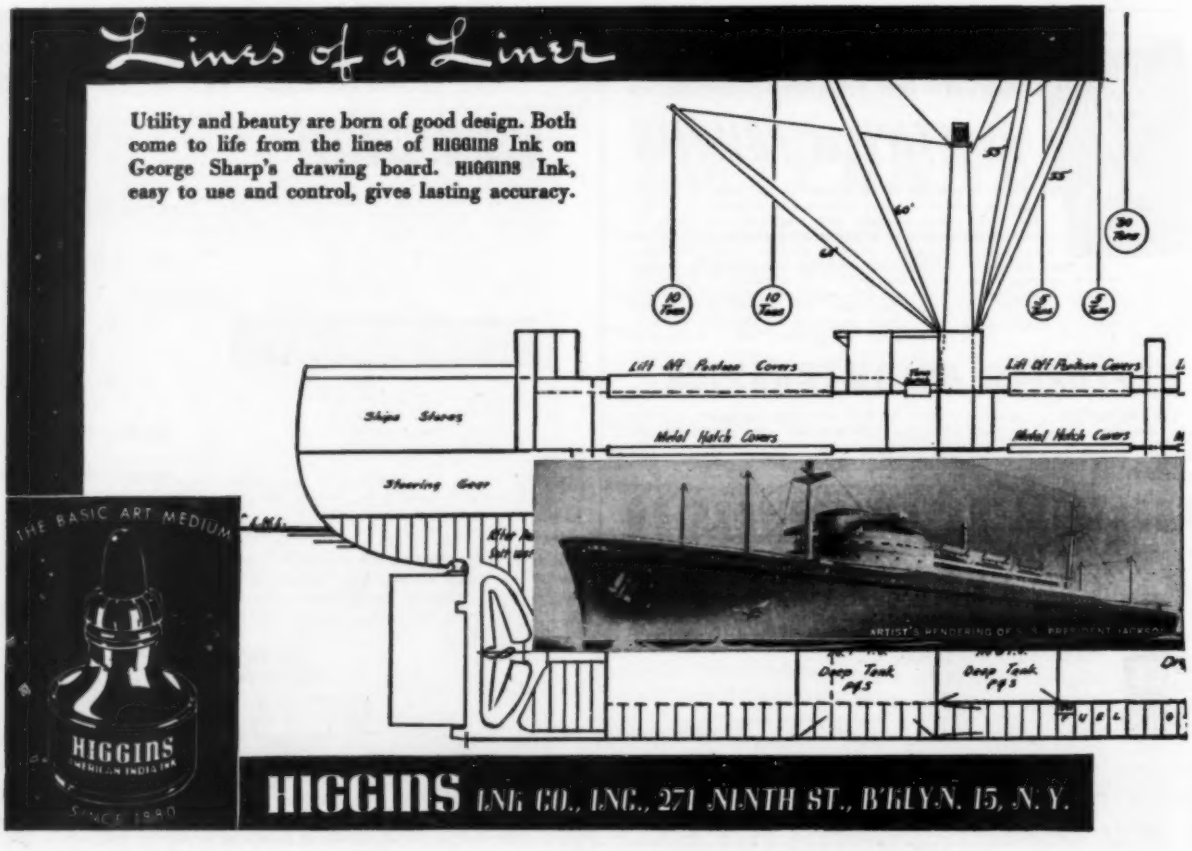
All of this and more is clearly explained and illustrated in this very helpful revised edition.

### Chemical Engineering Techniques

By B. E. Lauer and Russell F. Heckman. Cloth, 496 pp., 6¼ by 9¼ in., illus., $6. Reinhold Publishing Corp., New York, N. Y.

The six sections into which the book is divided clearly explain the techniques of assembling,

(Continued on page 44A)


Lines of a Liner
Utility and beauty are born of good design. Both come to life from the lines of HIGGINS Ink on George Sharp's drawing board. HIGGINS Ink, easy to use and control, gives lasting accuracy.
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What are *professional* tools? They are the kind that perform for years, safely and easily... that are made of special alloy steels and scientifically heat treated... that have advanced, tested designs... that are guaranteed. PROTO tools meet these tests because they are designed and manufactured for experts. To build a matched set of *professional* tools, fill your tool needs from your PROTO dealer's complete line. Send 10¢ for 68-page catalog to

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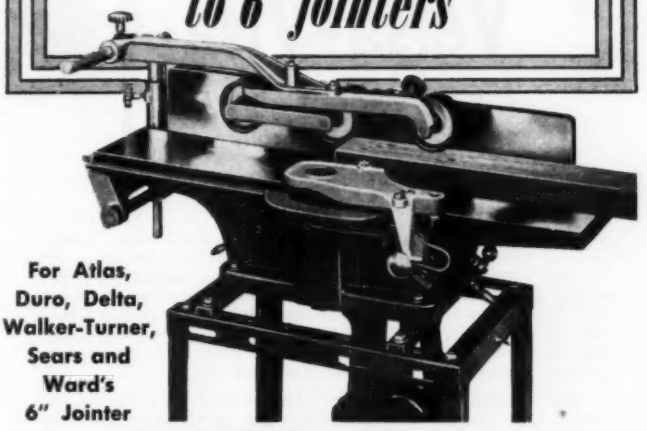

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**DURO'S new Safety Hold-down and Pressure Guard**

Duro introduces completely new Jointer accessories which greatly reduce personal injury hazard — and make operation faster, easier and more accurate.

"Hold-down" has rubber covered rollers which guide the stock, so hands are kept away from cutter head. Automatically maintains continuous, even pressure and guides stock toward fence — so that even warped or twisted lumber is planed perfectly flat and smooth. Swings out of way instantly when not needed.

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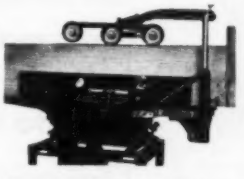

FIG. 1 — Showing 8½" vertical capacity of Hold-down

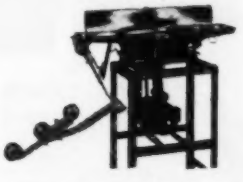

FIG. 2 — Note how easily "Hold-down" can be swung out of position.

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Makers of Nationally Advertised Duro-Chrome Hand Tools

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The Versa-Vise

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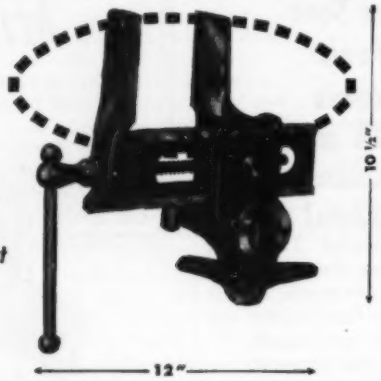


Used upright or on its side, the Will-Burt Versa-Vise rotates freely in a full circle — then locks automatically when the jaws are tightened. The 2½" x 3½" jaw surfaces give you the same positive, mar-free grip at the maximum 5" opening as with paper-thin material. Jobs you just couldn't handle with any other vise become routine when you use the Versa-Vise. It takes less than 10 seconds to switch from the vertical to the horizontal position. Place extra bases at strategic points around the shop and take the vise to the job.

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## NEW PUBLICATIONS

(Continued from page 42A)

transporting, and storing the materials used; size reduction and classifying the material; the mixing of materials preparatory for carrying out the chemical reactions; the separation and purifying of the materials; and the techniques for processing them for marketing and use.

### Braiding and Knotting for Amateurs

By Constantine A. Belash. Cloth, 133 pp., 5¼ by 7¾ in., illus., $1.75. Charles T. Branford Co., Boston, Mass.

This is a revised edition of this interesting book. It describes clearly the things one must know and do to make the projects illustrated. It can be recommended highly to young and old as an excellent introduction to an interesting hobby.

### Everyday Automobile Repairs

By William H. Crouse. Cloth, 296 pp., 5¾ by 8⅛ in., illus., $4. McGraw-Hill Book Co., Inc., New York, N. Y.

This is a revised edition of this text. It has been brought up to date on new developments in automotive operation and repairs.

The book describes the construction and operation of the various parts of the automobile, and also explains clearly how adjustments and repairs can be made. It is, therefore, a valuable book for students and owners of automobiles.

### How to Design and Install Plumbing

By A. J. Matthias, Jr., and Esles Smith, Sr. Cloth, 444 pp., 5¾ by 8½ in., illus., $3.95. American Technical Society, Chicago, Ill.

This is the third edition of this text. In it are included the new materials and fixtures used in up-to-date plumbing installations.

The illustrative example previously included has been retained. This helpful example covers the design and installation of the plumbing system required by a modern six-room dwelling. Blueprints and specifications are included.

### Enjoy Your Driving

By Richard J. O'Connor and Elizabeth C. O'Daly. Cloth, 144 pp., 5⅝ by 8¾ in., illus., $2. Oceana Publications, New York, N. Y.

A textbook for driver safety education. The frightful havoc caused by automobiles will be cut down more and more as an increasing number of schools start to offer safe driver training.

This book with its simple and direct instructions, will be a great help in making America safe.

### Tailoring Suits the Professional Way

By Clarence Poulin. Cloth, 192 pp., 6⅛ by 9⅜16 in., illus., $4.50. Chas. A. Bennett Co., Inc., Peoria 3, Ill.

A useful and informative book for the beginning teacher, explaining each step in making the different parts of men's and women's wearing apparel.

The directions are given in plain understandable language and the book is well illustrated.

### Modern Arc Welding

Leatherette cover, 544 pp., 5¾ by 8 in., $3. The Hobart Trade School, Troy, Ohio

This is a comprehensive and practical textbook on the procedure and practice of arc welding. It is valuable not only to the student, but also to

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The 28 chapters are divided into five parts: Part 1 discusses the development of electric arc welding, describes applications, available metals and alloys, joints and welds, electrodes, equipment, and other basic procedures. Part 2 constitutes a self-study course, incorporating review summaries, practical exercises, and "quiz" questions. Part 3 describes in detail the principles and practical operations of carbon arc welding. Part 4 covers other welding processes such as inert-gas-shielded arc welding, submerged arc welding, and electric stud welding. Part 5 reproduces the welding terms and their definitions of American Welding Society.

The book contains over 600 illustrations of operations, diagrams, and charts.

### Fix Your Ford

By Bill Toboldt. Cloth, 208 pp., 6 by 8¾ in., illus. Goodheart-Wilcox Co., Inc., Chicago, Ill.

An interesting and helpful text for the handyman who drives a 6- or an 8-cylinder Ford — models from 1932 to 1952 inclusive.

The book will be equally helpful to the experienced mechanic who wants to learn how to speed up his work.

The text is divided into chapters dealing with overhauling jobs, carburetors and fuel systems, overhauling the clutch and transmission, tips on rear axle and brake service, servicing the Ford 6-engine, and trouble shooting.

### Farm Power

By Ben D. Moses and Kenneth R. Frost. Cloth, 484 pp., 6⅛ by 9¼ in., illus., $5.75. John Wiley & Sons, Inc., New York City.

Written by two professors of agricultural engineering who had lots of practical experience in the use, manufacture, and sale of agricultural machinery, this book is an excellent text for students who are studying the how and why of farm power machinery.

The book is written in nontechnical language and will give the students a good understanding of the principles and operations of internal combustion engines, automobiles, and tractors.

### How to Buy, Keep, and Enjoy Your Car

By Frank Mitchell. Cloth, 176 pp., 5⅝ by 8⅝ in., illus., $2.50. Arco Publishing Co., 420 Lexington Ave., New York 17, N. Y.

A book for the man who owns a car or wants to acquire one. It tells interestingly how to buy a car, how to keep it in good condition, how to drive, how to foresee troubles, and what to have done to the car in spring and fall.

The book also contains a list of troubles and how to locate them, and what to do about them. There also is a glossary of terms.

### General Metals

By John L. Feirer. Cloth, 257 pp., 6¾ by 9½ in., illus., $3. McGraw-Hill Book Co., New York 36, N. Y.

An excellent text for the general metal shop, the metal area of a general shop, and for the home shop.

It covers the manipulative processes of bench metal, wrought iron, sheet metal, art metal and jewelry, forging, heat-treating, foundry, welding, and machine-shop practice.

There also is a chapter of related subjects material telling the story of iron, steel, copper, and aluminum.

The book also contains a number of projects, and a correlated list of visual aids.


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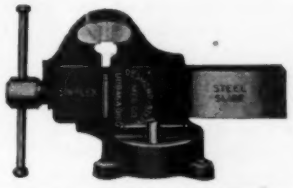
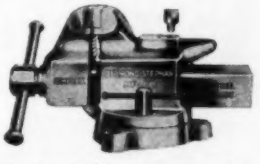
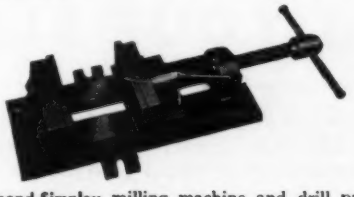
● Whatever your vise requirements — machinists, filers, weldors, milling machine and drill press, combination pipe, wood workers — specify Desmond-Simplex and you'll get the best quality that money can buy. Yet you'll pay no more than ordinary vises.



Only **Desmond-Simplex** has the STEEL SLIDE, guaranteed against breakage for the life of the vise. Steel screw is fully enclosed for complete protection. Outside screw retainer permits easiest lubrication. Hardened jaw inserts fit on shoulder in casting, stand heaviest blows, are easily replaced.



**Desmond-Simplex** Utility Vise has the most features at the lowest cost — hardened jaw inserts; pipe jaws; hardened cut off tool; anvil with horn; steel channel slide encloses screw; swivel base; non-pinching type handle. Four sizes for all requirements.



**Desmond-Simplex** milling machine and drill press vises are precision made, have maximum ruggedness for long service.

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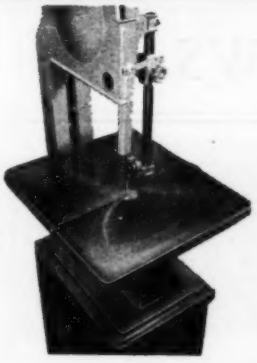

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Leading SCHOOLS and UNIVERSITIES are using HARPER ELECTRIC KILNS to provide their students with the finest Ceramic training and also because they have found Harper Kilns to be more economical to operate in the long run.

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have many time-saving applications but users often find a Foredom REPAYS ITS COST on ONE JOB through eliminating an expensive disassembly and re-set job on such tasks as removing high spots on gears and touching up tools or cutters in a production set-up. The secret's in Foredom's extra small handpieces which handle like a pencil and penetrate into spots inaccessible for other tools.

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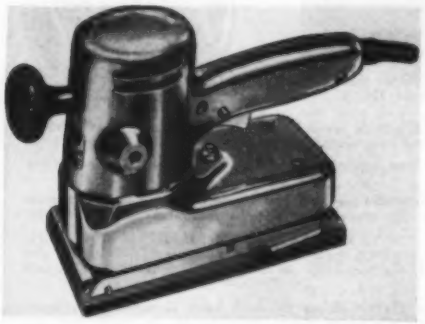
# SHOP EQUIPMENT NEWS

## NEW BLACK AND DECKER SANDER

A new portable electric sander for finishing operations on wood, metal, plastics, etc., has been announced by The Black & Decker Mfg. Co. Known as the No. 44 Sander, this tool can be used for refinishing furniture; sanding down window sills, trim work, etc., prior to repainting; leveling wood, wallboard or plaster wall joints; and *feather-edging* painted surfaces on wood or metal.



Black & Decker Utility No. 44 Sander

This sander has a king-size bottom plate which extends beyond the body of the tool permitting sanding in close quarters such as right up to the riser on a stair tread. The knob handle can be placed on either side or the front of the housing depending on what is being sanded and for operator comfort. The switch handle is located close to the base for maximum control and to reduce any possible operator fatigue.

It also has a unique paper holder. When attaching or detaching abrasive paper, the holder will remain open permitting the operator to use both hands and enabling him to place paper on the tool tightly and easily.

The sanding surface of this sander is 3⅝ by 9 in., which is ⅓ of standard 9 by 11-in. abrasive paper. The platen orbits at 4250 per minute with an orbit diameter of 3/16 in., permitting the sander to be used in any direction on wood without showing swirl marks. No final hand sanding is required with the No. 44 Sander.

The tool weighs only 5½ lb. It has aluminum housings, closed-type grease-sealed ball bearings, and a "universal" motor made by Black & Decker for use on 115-volt a.c. or d.c. current. Each tool comes equipped with two sheets each of coarse, medium, and fine abrasive paper measuring 3⅝ by 9 in.

For further information contact *The Black & Decker Mfg. Co., Towson 4, Md.*

**For brief reference use IAVE — 0801.**

## NEW H AND A BAND SAW

Heston & Anderson, Fairfield, Iowa, have announced the addition of a new band saw to the firm's line of machines.

The new saw known as the 14K Band Saw is a 14-in. band saw equipped with a large 20 by 23-in. tilting table made of heavily ribbed cast iron. It has a capacity of 12½ in. vertically (table top to wheel guard) and 13¾ in. horizontally (blade to main guard).

The product's frame and base are made of heavy gray iron and steel for maximum stability. The motor base is easily adjusted and requires no belt tightening device. Upper and lower wheel guard is one piece and opens instantly, on a hinge, for changing blades.

New Heston and Anderson Band Saw

The upper wheel spring suspension device and blade tension hand wheel are simple, yet effective. The free-turning hand wheel raises or lowers the large, dynamically balanced upper wheel for blade tension.

For further information concerning the new band saw, write to *Heston and Anderson, Fairfield, Iowa.*

**For brief reference use IAVE — 0802.**

## STICK-TYPE WAX LUBRICANT AND NEW CHARTS

A stick-type wax lubricant is now made available by The DoAll Company for lubrication of cutting tools, threaded metal fastenings, and other metallic forming tools used in production manufacturing, toolrooms, and home workshops. The product called "Tool-Saver," is designed to reduce the friction and the accompanying heat occurring in machining operations. In many cases, burrs resulting from machining are eliminated through the use of the Tool-Saver and production cost correspondingly lowered since deburring operations are made unnecessary.

A pound of DoAll Tool-Saver is supplied in a handy "push-out" cardboard dispenser tube, 2 in. in diameter by 12 in., and is applied directly to the cutting edges of the tool or to the surface of the material that is to be machined.

Stick-Type Wax Lubricant

"Tool-Saver" is recommended for use on such tools as saw bands, knife bands, circular saws, hack saws, carpenter saws, twist drills, taps, reamers, countersinks, spinning tools, grinding wheels, sanding belts or wheels, routing tools, etc. Applied to wood screws, it greatly eases driving. When used in certain grinding or sanding operations it prevents burning and promotes good finish.

This firm recently published folders giving technical data on various types of production bands and granite surface plates. They also have made available a brochure explaining how gauge blocks are used and assembled in order to do extremely accurate measuring.

For further information about the foregoing, write to *The DoAll Co., Des Plaines, Ill.*

**For brief reference use IAVE — 0803.**

## NEW V. & E. TEC LEAD HOLDER

The VEMCO TEC Lead Holder, newest item in the VEMCO line of drawing equipment, is a lightweight, finely balanced instrument that tapers evenly to the point and is ideal for both drawing lines and lettering.

V. & E. Tec Lead Holder

The Lead Holder incorporates the exclusive TEC chucking device which holds the lead evenly with no tendency to pinch it off. The chuck is concealed within the body of the holder. The entire instrument is made of durable lightweight materials.

For complete information write *V. & E. Mfg. Co., P.O. Box 950M, Pasadena 20, Calif.*

**For brief reference use IAVE — 0804.**

## NEW VISE WITH SHOCKPROOF SAFETY HANDLE

An important improvement has been put by the Wilton Tool Company on their new machinist vises of 3½ in. and up. The improvement con-

(Continued on page 50A)

make one permanent* investment.
. . . forget about replacements.

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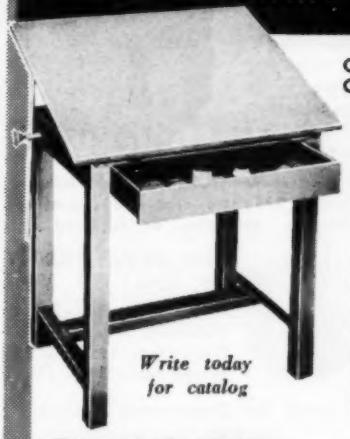

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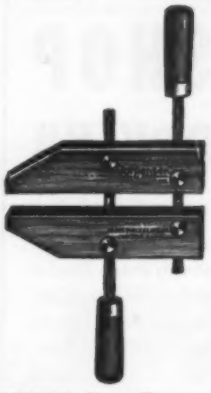

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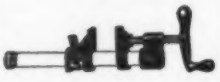

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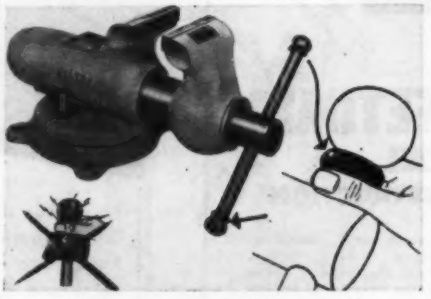
# SHOP EQUIPMENT NEWS

(Continued from page 48A)

sists of a shockproof safety handle which positively prevents finger-pinching and greatly reduces noise and jarring.

The thick, pliable rubber rings mounted on the vise handles are oilproof and greaseproof. Made to last for many years, they will provide much needed safety and reduce shop noise.

Because of the "give" to these rubber rings, contact with the fingers is harmless, even when the handle is accidentally dropped. Moreover,



Wilton Vise with Shockproof Safety Handle

the shape of the rubber ring is such that it forces the flesh away from the handle instead of wedging it into the spindle-head hole.

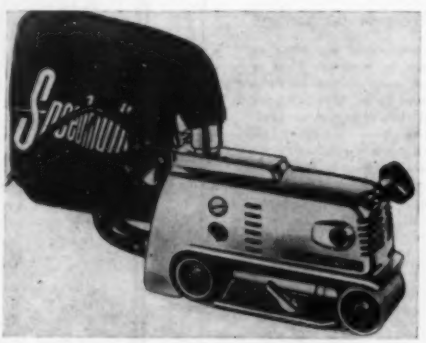
In addition to having the shockproof safety handle, the Wilton vise also has interchangeable and reversible jaws and is equipped with a swivel base which may be locked into any desired position. The vises are finished in battleship gray.

You will receive a catalog with complete range of styles and prices by writing to the *Wilton Tool Mfg. Co., 925–41 Wrightwood Ave., Chicago 14, Ill.*

**For brief reference use IAVE — 0805.**

## NEW DUSTLESS SANDER FOR HEAVY-DUTY OPERATION

The Porter-Cable Machine Company has just placed on the market a new dustless sander designed for rough sanding or finishing in woodworking shops, maintenance departments, millwork shops, schools, and throughout the construction industry.



Heavy-Duty Dustless Sander

The new sander, Model 503, can be used on wood, metal, plastic, and glass. Over 85 per cent of the sanding dust is picked up by the sander's vacuum system. This prevents the belt from clogging and the abrasive grains are free to do more work in less sanding time.

(Continued on page 52A)

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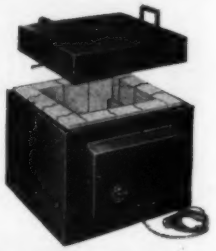
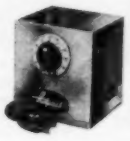


Kit contains everything you need including complete 20 photo illustrated step-by-step instructions. Everything cut to exact size.



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# SHOP EQUIPMENT NEWS

(Continued from page 50A)

A sander's belt speed of 1120 s.f.p.m. permits cool, even sanding so that a flawless finish may be produced on any job. The belt tension device on the Model 503 makes belt changes easy. A belt tracking control quickly centers the 3 by 24-in. belt on the pulleys with a simple knurled knob adjustment.

The sander weighs only 15 lb., and it is easy to handle for long hours with a minimum of operator fatigue.

The Model 503 Sander has a heavy-duty 115-v. a.c.-d.c. motor. The dimensions of the machine are 5½ by 8 by 16¾ in.

Standard equipment for the new tool includes a resilient cork pad and steel shoe cover, 10-ft. cord and rubber plug, front and rear handles, three assorted abrasive belts, dust collecting bag and nozzle, and two tubes of special grease.

For further information write to *Porter-Cable Machine Co., Dept. PR-6, Syracuse 8, N. Y.*

**For brief reference use IAVE — 0806.**

## SPECIAL LOADING OF KODACHROME FILM FOR STEREO CAMERAS

A new special loading of 35mm. Kodachrome Film, Daylight Type, for use in stereo cameras making 23 by 24mm.-size frames with standard spacing, and a new stereo mounting service for stereo pictures made on standard K135 and K135A films, has been announced by the Eastman Kodak Company.

The new loading, known as Kodachrome Film 335, Daylight Type, provides enough film for twenty 23 by 24mm. stereo pairs. When this film is sent in for processing, the pairs will be stereo mounted for hand viewing without additional charge. The dimensions of the mount come within the proposed ASA standard, and the stereo window appears to be at 5 ft.

Until January 1, 1953, stereo mounting service for the new film will be available only from the Kodak Processing Laboratory at Rochester, N. Y. After that date, however, it is expected that the stereo mounting service will also be available from the Chicago and Hollywood laboratories.

For further information write to *Eastman Kodak Co., Rochester 4, N. Y.*

**For brief reference use IAVE — 0807.**

## STICKLEBACK CARVING TOOLS

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For sizes and prices write to *Drilsaw Co., 1561 Virginia Ave., Glendale 2, Calif.*

**For brief reference use IAVE — 0808.**

## THORDARSON-MEISSNER TRANSFORMER KIT

An opportunity for teaching transformer theory and operation is now available through the use of the Thordarson-Meissner TKF-1 Transformer kit made up of unassembled materials from the production line.

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(Continued on page 54A)

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## SHOP EQUIPMENT NEWS

(Continued from page 52A)

winding secondaries of varying voltage and current values. Information is also included for the advanced student to design and build other primaries and secondaries.

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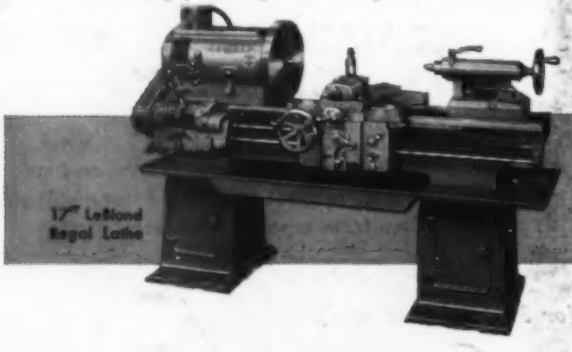

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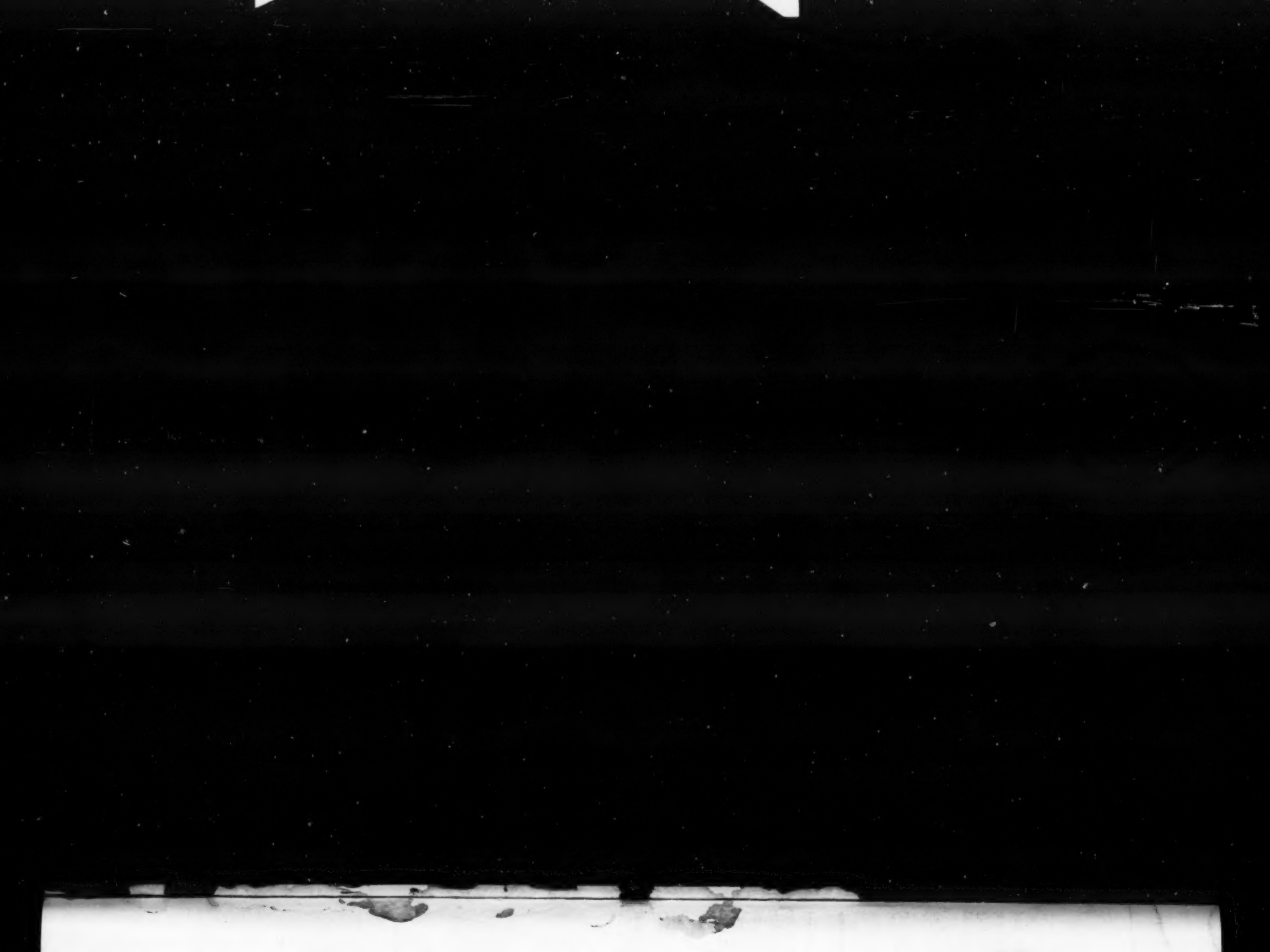
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